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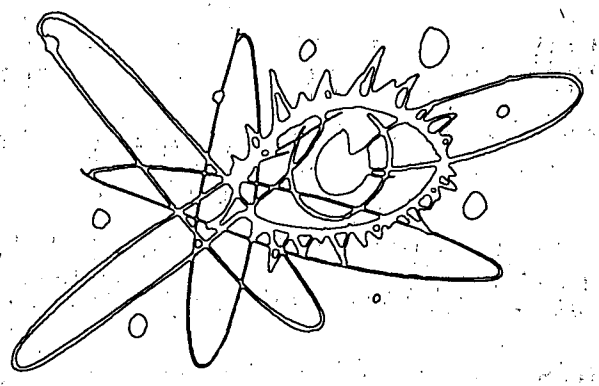

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Astounding
SCIENCE FICTION

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EDITORIAL

NECESSARY ISN'T SUFFICIENT

To make an electric motor, it is necessary to have insulation, wire, and iron for the magnetic pole pieces and the armature. They're making some small and highly efficient direct-current motors now that use alnico permanent magnets for the field, so we can consider one of that type as an example of the more general class "electric motor." Whether you use a field-coil or a permanent magnet field in a DC motor is relatively unimportant for general consideration.

These things are necessary. But they are NOT sufficient. It would be possible to make two units, identical in every mechanical detail, indistinguishable by any chemical test, by any mechanical test, or any optical test—only that one had an alnico alloy slug that had not been magnetized. Every mechanical requirement for a functional electric motor would be present—except the fact that it wouldn't work, the ultimate mechanical test in the case of a motor.

The components that are present are all probably necessary—but they are not sufficient. Yet the one missing component is invisible, intangible—in the specific sense of being not-touchable—immaterial, but not irrelevant. It has, as a matter of fact, a remarkable resemblance to "happiness"; it can't be weighed, seen, tested for chemically, touched, doesn't occupy space in the normal sense of exclusiveness—two magnetic fields can occupy the same space at the same time—and generally has none of the characteristics normally demanded of a thing before it is granted status as "a reality."

But the motor stubbornly, irrationally, refuses to function. It's obvious to any observer that there is no reason for its failure to behave in a proper manner; clearly, it is behaving in an irrational, inappropriate manner. You can't point to any tangible, real thing to explain in any logical, sensible manner, why that motor refuses to co-operate.

There's another interesting comparison one can make. No mechani-

(*Continued on page* 160)

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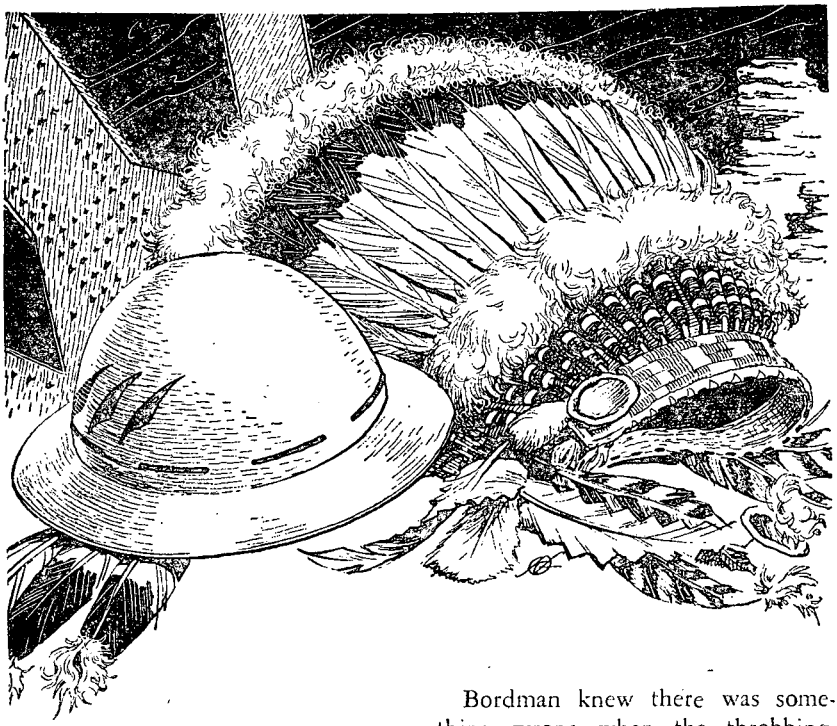

SAND DOOM

BY MURRAY LEINSTER

The problem was as neat a circle as one could ask for; without repair parts, they couldn't bring in the ship that carried the repair parts!

Illustrated by Freas

Bordman knew there was something wrong when the throbbing, acutely uncomfortable vibration of rocket blasts shook the ship. Rockets were strictly emergency devices, these days, so when they were used there was obviously an emergency.

He sat still. He had been reading, in the passenger lounge of the *Warlock*—a very small lounge indeed—but as a senior Colonial Survey officer he was well-traveled enough to know when things did not go right. He looked up from the bookscreen, waiting. Nobody came to explain the eccentricity of a spaceship using rockets. It would have been immediate, on a regular liner, but the *Warlock* was practically a tramp.

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This trip it carried just two passengers. Passenger service was not yet authorized to the planet ahead, and would not be until Bordman had made the report he was on his way to compile. At the moment, though, the rockets blasted, and stopped, and blasted again. There was something definitely wrong.

The *Warlock*'s other passenger came out of her cabin. She looked surprised. She was Aletha Redfeather, an unusually lovely Amerind. It was extraordinary that a girl could be so self-sufficient on a tedious space-voyage, and Bordman approved of her. She was making the journey to Xosa II as a representative of the Amerind Historical Society, but she'd brought her own bookreels and some elaborate fancywork which—woman-fashion—she used to occupy her hands. She hadn't been at all a nuisance. Now she tilted her head on one side as she looked inquiringly at Bordman.

"I'm wondering, too," he told her, just as an especially sustained and violent shuddering of rocket-impulsion made his chair legs thutter on the floor.

There was a long period of stillness. Then another violent but much shorter blast. A shorter one still. Presently there was a half-second blast which must have been from a single rocket tube because of the mild shaking it produced. After that there was nothing at all.

Bordman frowned to himself. He'd been anticipating groundfall within a matter of hours, certainly. He'd just gone through his specbook carefully and re-familiarized himself with the work he was to survey on Xosa II. It was a perfectly commonplace minerals-planet development, and he'd expected to clear it FE—fully established—and probably TP and NQ ratings as well, indicating that tourists were permitted and no quarantine was necessary. Considering the aridity of the planet, no bacteriological dangers could be expected to exist, and if tourists wanted to view its monstrous deserts and infernolike wind sculptures—why they should be welcome.

But the ship had used rocket drive in the planet's near vicinity. Emergency. Which was ridiculous. This was a perfectly routine sort of voyage. Its purpose was the delivery of heavy equipment—specifically a smelter—and a senior Colonial Survey officer to report the completion of primary development.

Aletha waited, as if for more rocket blasts. Presently she smiled at some thought that had occurred to her.

"If this were an adventure tape," she said humorously, "the loudspeaker would now announce that the ship had established itself in an orbit around the strange, uncharted planet first sighted three days ago, and that volunteers were wanted for a boat landing."

Bordman demanded impatiently:

"Do you bother with adventure tapes? They're nonsense! A pure waste of time!"

Aletha smiled again.

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"My ancestors," she told him, "used to hold tribal dances and make medicine and boast about how many scalps they'd taken and how they did it. It was satisfying—and educational for the young. Adolescents became familiar with the idea of what we nowadays call adventure. They were partly ready for it when it came. I suspect your ancestors used to tell each other stories about hunting mammoths and such. So I think it would be fun to hear that we were in orbit and that a boat landing was in order."

Bordman grunted. There were no longer adventures. The universe was settled; civilized. Of course there were still frontier planets—Xosa II was one—but pioneers had only hardships. Not adventures.

The ship-phone speaker clicked. It said curtly:

"Notice. We have arrived at Xosa II and have established an orbit about it. A landing will be made by boat."

Bordman's mouth dropped open.

"What the devil's this?" he demanded.

"Adventure, maybe," said Aletha. Her eyes crinkled very pleasantly when she smiled. She wore the modern Amerind dress—a sign of pride in the ancestry which now implied such diverse occupations as interstellar steel construction and animal husbandry and llano-planet colonization. "If it were adventure, as the only girl on this ship I'd have to be in the landing party, lest the tedium of orbital waiting make the"—her smile widened to a grin—"the pent-up restlessness of trouble-makers in the crew—"

The ship-phone clicked again.

"Mr. Bordman. Miss Redfeather. According to advices from the ground, the ship may have to stay in orbit for a considerable time. You will accordingly be landed by boat. Will you make yourselves ready, please, and report to the boat-blister?" The voice paused and added, *"Hand luggage only, please."*

Aletha's eyes brightened. Bordman felt the shocked incredulity of a man accustomed to routine when routine is impossibly broken. Of course survey ships made boat landings from orbit, and colony ships let down robot hulls by rocket when there was as yet no landing grid for the handling of a ship. But never before in his experience had an ordinary freighter, on a routine voyage to a colony ready for its final degree-of-completion survey, ever landed anybody by boat.

"This is ridiculous!" said Boardman, fuming.

"Maybe it's adventure," said Aletha. "I'll pack."

She disappeared into her cabin. Bordman hesitated. Then he went into his own. The colony on Xosa II had been established two years ago. Minimum comfort conditions had been realized within six months. A temporary landing grid for light supply ships was up within a year. It had permitted stock-piling, and it had been taken down to be rebuilt

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as a permanent grid with every possible contingency provided for. The eight months since the last ship landing was more than enough for the building of the gigantic, spidery, half-mile-high structure which would handle this planet's interstellar commerce. There was no excuse for an emergency! A boat landing was nonsensical!

But he surveyed the contents of his cabin. Most of the cargo of the *Warlock* was smelter equipment which was to complete the outfitting of the colony. It was to be unloaded first. By the time the ship's holds were wholly empty, the smelter would be operating. The ship would wait for a full cargo of pig metal. Bordman had expected to live in this cabin while he worked on the survey he'd come to make, and to leave again with the ship.

Now he was to go aground by boat. He fretted. The only emergency equipment he could possibly need was a heat-suit. He doubted the urgency of that. But he packed some clothing for indoors, and then defiantly included his specbook and the volumes of definitive data to which specifications for structures and colonial establishments always referred. He'd get to work on his report immediately he landed.

He went out of the passenger's lounge to the boat-blister. An engineer's legs projected from the boat port. The engineer withdrew, with a strip of tape from the boat's computer. He compared it dourly with a similar strip from the ship's figure-box. Bordman consciously acted according to the best traditions of passengers.

"What's the trouble?" he asked.

"We can't land," said the engineer shortly.

He went away—according to the tradition by which ships' crews are always scornful of passengers.

Bordman scowled. Then Aletha came, carrying a not-too-heavy bag. Bordman put it in the boat, disapproving of the crampedness of the craft. But this wasn't a lifeboat. It was a landing boat. A lifeboat had Lawlor drive and could travel light-years, but in the place of rockets and rocket fuel it had air-purifiers and water-recovery units and food-stores. It couldn't land without a landing grid aground, but it could get to a civilized planet. This landing boat could land without a grid, but its air wouldn't last long.

"Whatever's the matter," said Bordman darkly, "it's incompetence somewhere!"

But he couldn't figure it out. This was a cargo ship. Cargo ships neither took off nor landed under their own power. It was too costly of fuel they would have to carry. So landing grids used local power—which did not have to be lifted—to heave ships out into space, and again used local power to draw them to ground again. Therefore ships carried fuel only for actual space-flight, which was economy. Yet landing grids had no moving parts, and while they did have to be monstrous structures they ac-

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tually drew power from planetary ionospheres. So with no moving parts to break down and no possibility of the failure of a power source—landing grids couldn't fail! So there couldn't be an emergency to make a ship ride orbit around a planet which had a landing grid!

The engineer came back. He carried a mail sack full of letter-reels. He waved his hand. Aletha crawled into the landing-boat port. Bordman followed. Four people, with a little crowding, could have gotten into the little ship. Three pretty well filled it. The engineer followed them and sealed the port.

"Sealed off," he said into the microphone before him.

The exterior-pressure needle moved halfway across the dial. The interior-pressure needle stayed steady.

"All tight," said the engineer.

The exterior-pressure needle flicked to zero. There were clanking sounds. The long halves of the boat-blister stirred and opened, and abruptly the landing boat was in an elongated cup in the hull-plating, and above them there were many, many stars. The enormous disk of a nearby planet floated into view around the hull. It was monstrous and blindingly bright. It was of a tawny color, with great, irregular areas of yellow and patches of bluishness. But most of it was the color of sand. And all its colors varied in shade—some places were lighter and some darker—and over at one edge there was blinding whiteness which could not be anything but an ice cap. But Bordman knew that there was no ocean or sea or lake on all this whole planet, and the ice cap was more nearly hoarfrost than such mile-deep glaciation as would be found at the poles of a maximum-comfort world.

"Strap in," said the engineer over his shoulder. "No-gravity coming, and then rocket-push. Settle your heads."

Bordman irritably strapped himself in. He saw Aletha busy at the same task, her eyes shining. Without warning, there came a sensation of acute discomfort. It was the landing boat detaching itself from the ship and the diminishment of the ship's closely-confined artificial-gravity field. That field suddenly dropped to nothingness, and Bordman had the momentary sickish dizziness that flicked-off gravity always produces. At the same time his heart pounded unbearably in the instinctive, racial-memory reaction to the feel of falling.

Then roarings. He was thrust savagely back against his seat. His tongue tried to slide back into his throat. There was an enormous oppression on his chest. He found himself thinking panicky profanity.

Simultaneously the vision ports went black, because they were out of the shadow of the ship. The landing boat turned—but there was no sensation of centrifugal force—and they were in a vast obscurity with merely a dim phantom of the planetary surface to be seen. But behind

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them a blue-white sun shone terribly. Its light was warm—hot—even though it came through the polarized shielding ports.

"Did . . . did you say," panted Aletha happily—breathless because of the acceleration—"that there weren't any adventures?"

Bordman did not answer. But he did not count discomfort as an adventure.

The engineer did not look out the ports at all. He watched the screen before him. There was a vertical line across the side of the lighted disk. A blip moved downward across it, showing their height in thousands of miles. After a long time the blip reached the bottom, and the vertical line became double and another blip began to descend. It measured height in hundreds of miles. A bright spot—a square—appeared at one side of the screen. A voice muttered metallically, and suddenly seemed to shout, and then muttered again. Bordman looked out one of the black ports and saw the planet as if through smoked glass. It was a ghostly reddish thing which filled half the cosmos. It had mottlings. Its edge was curved. That would be the horizon.

The engineer moved controls and the white square moved. It went across the screen. He moved more controls. It came back to the center. The height-in-hundreds blip was at the bottom, now, and the vertical line tripled and a tens-of-miles-height blip crawled downward.

There were sudden, monstrous plungings of the landing boat. It had hit the outermost fringes of atmosphere. The engineer said words it was not appropriate for Aletha to hear. The plungings became more violent. Bordman held on—to keep from being shaken to pieces despite the straps—and stared at the murky surface of the planet. It seemed to be fleeing from them and they to be trying to overtake it. Gradually, very gradually, its flight appeared to slow. They were down to twenty miles, then.

Quite abruptly the landing boat steadied. The square spot bobbed about in the center of the astrogation screen. The engineer worked controls to steady it.

The ports cleared a little. Bordman could see the ground below more distinctly. There were patches of every tint that mineral coloring could produce. There were vast stretches of tawny sand. A little while more, and he could see the shadows of mountains. He made out mountain flanks which should have had valleys between them and other mountain flanks beyond, but they had tawny flatnesses between, instead. These, he knew, would be the sand plateaus which had been observed on this planet and which had only a still-disputed explanation. But he could see areas of glistening yellow and dirty white, and splashes of pink and streaks of ultramarine and gray and violet, and the incredible red of iron oxide covering square miles—too much to be believed.

The landing-boat's rockets cut off.

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It coasted. Presently the horizon tilted and all the dazzling ground below turned sedately beneath them. There came staccato instructions from a voice-speaker, which the engineer obeyed. The landing boat swung low—below the tips of giant mauve mountains with a sand plateau beyond them—and its nose went up. It stalled.

Then the rockets roared again—and now, with air about them and after a momentary pause, they were horribly loud—and the boat settled down and down upon its own tail of fire.

There was a completely blinding mass of dust and rocket fumes which cut off all sight of everything else. Then there was a crunching crash, and the engineer swore peevishly to himself. He cut the rockets again. Finally.

Bordman found himself staring straight up, still strapped in his chair. The boat had settled on its own tail fins, and his feet were higher than his head, and he felt ridiculous. He saw the engineer at work unstrapping himself. He duplicated the action, but it was absurdly difficult to get out of the chair.

Aletha managed more gracefully. She didn't need help.

"Wait," said the engineer ungraciously, "till somebody comes."

So they waited, using what had been chair backs for seats.

The engineer moved a control and the windows cleared further. They saw the surface of Xosa II. There was no living thing in sight. The ground itself was pebbles and small rocks and minor boulders—all apparently tumbled from the starkly magnificent mountains to one side. There were monstrous, many-colored cliffs and mesas, every one eaten at in the unmistakable fashion of wind-erosion. Through a notch in the mountain wall before them a strange, fan-shaped, frozen formation appeared. If such a thing had been credible, Bordman would have said that it was a flow of sand simulating a waterfall. And everywhere there was blinding brightness and the look and feel of blistering sunshine. But there was not one single leaf or twig or blade of grass. This was pure desert. This was Xosa II.

Aletha regarded it with bright eyes.

"Beautiful!" she said happily. "Isn't it?"

"Personally," said Bordman, "I never saw a place that looked less homelike or attractive."

Aletha laughed.

"My eyes see it differently."

Which was true. It was accepted, nowadays, that humankind might be one species but was many races, and each saw the cosmos in its own fashion. On Kalmet III there was a dense, predominantly Asiatic population which terraced its mountainsides for agriculture and deftly mingled modern techniques with social customs not to be found on—say—Demeter I, where there were many red-tiled stucco towns and very many olive

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groves. In the llano planets of the Equis cluster, Amerinds—Aletha's kin—zestfully rode over plains dotted with the descendants of buffalo and antelope and cattle brought from ancient Earth. On the oases of Rustam IV there were date palms and riding camels and much argument about what should be substituted for the direction of Mecca at the times for prayer, while wheat fields spanned provinces on Canna I and highly civilized emigrants from the continent of Africa on Earth stored jungle gums and lustrous gems in the warehouses of their spaceport city of Timbuk.

So it was natural for Aletha to look at this wind-carved wilderness otherwise than as Bordman did. Her racial kindred were the pioneers of the stars, these days. Their heritage made them less than appreciative of urban life. Their inborn indifference to heights made them the steel-construction men of the cosmos, and more than two-thirds of the landing grids in the whole galaxy had their coup-feather symbols on the key posts. But the planet government on Algonka V was housed in a three-thousand-foot white stone tepee, and the best horses known to men were raised by ranchers with bronze skins and high cheekbones on the llano planet Chagan.

Now, here, in the *Warlock*'s landing boat, the engineer snorted. A vehicle came around a cliff wall, clanking its way on those eccentric caterwheels that new-founded colonies find so useful. The vehicle glittered. It crawled over tumbled boulders, and flowed over fallen scree. It came briskly toward them. The engineer snorted again.

"That's my cousin Ralph!" said Aletha in pleased surprise.

Bordman blinked and looked again. He did not quite believe his eyes. But they told the truth. The figure controlling the ground car was Indian—Amerind—wearing a breechcloth and thick-soled sandals and three streamlined feathers in a band about his head. Moreover, he did not ride in a seat. He sat astride a semi-cylindrical part of the ground car, over which a gaily-colored blanket had been thrown.

The ship's engineer rumbled disgustedly. But then Bordman saw how sane this method of riding was—here. The ground vehicle lurched and swayed and rolled and pitched and tossed as it came over the uneven ground. To sit in anything like a chair would have been foolish. A back rest would throw one forward in a frontward lurch, and give no support in case of a backward one. A sidewise tilt would tend to throw one out. Riding a ground car as if in a saddle was sense!

But Bordman was not so sure about the costume. The engineer opened the port and spoke hostilely out of it:

"D'you know there's a lady in this thing?"

The young Indian grinned. He waved his hand to Aletha, who pressed her nose against a viewport.

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And just then Bordman did understand the costume or lack of it. Air came in the open exit port. It was hot and dessicated. It was furnace-like!

"How, 'Letha," called the rider on the caterwheel steed. "Either dress for the climate or put on a heat-suit before you come out of there!"

Aletha chuckled. Bordman heard a stirring behind him. Then Aletha climbed to the exit port and swung out. Bordman heard a dour muttering from the engineer. Then he saw her greeting her cousin. She had slipped out of the conventionalized Amerind outfit to which Bordman was accustomed. Now she was clad as Anglo-Anglo-Saxon—girls dressed for beaches on the cool-temperature planets.

For a moment Bordman thought of sunstroke, with his own eyes dazzled by the still-partly-filtered sunlight. But Aletha's Amerind coloring was perfectly suited to sunshine even of this intensity. Wind blowing upon her body would cool her skin. Her thick, straight black hair was at least as good protection against sunstroke as a heat-helmet. She might feel hot, but she would be perfectly safe. She wouldn't even sunburn. But he, Bordman—

He grimly stripped to underwear and put on the heat-suit from his bag. He filled its canteens from the boat's water tank. He turned on the tiny, battery-powered motors. The suit ballooned out. It was intended for short periods of intolerable heat. The motors kept it inflated—away from his skin—and cooled its interior by the evaporation of sweat plus water from its canteen tanks. It was a miniature air-conditioning system for one man, and it should enable him to endure temperatures otherwise lethal to someone with his skin and coloring. But it would use a lot of water.

He climbed to the exit port and went clumsily down the exterior ladder to the tail fin. He adjusted his goggles. He went over to the chattering young Indians, young man and girl. He held out his gloved hand.

"I'm Bordman," he said painfully. "Here to make a degree-of-completion survey. What's wrong that we had to land by boat?"

Aletha's cousin shook hands cordially.

"I'm Ralph Redfeather," he said, introducing himself. "Project engineer. About everything's wrong. Our landing grid's gone. We couldn't contact your ship in time to warn it off. It was in our gravity field before it answered, and its Lawlor drive couldn't take it away—not working because of the field. Our power, of course, went with the landing grid. The ship you came in can't get back, and we can't send a distress message anywhere, and our best estimate is that the colony will be wiped out—thirst and starvation—in six months. I'm sorry you and Aletha have to be included."

Then he turned to Aletha and said amiably:

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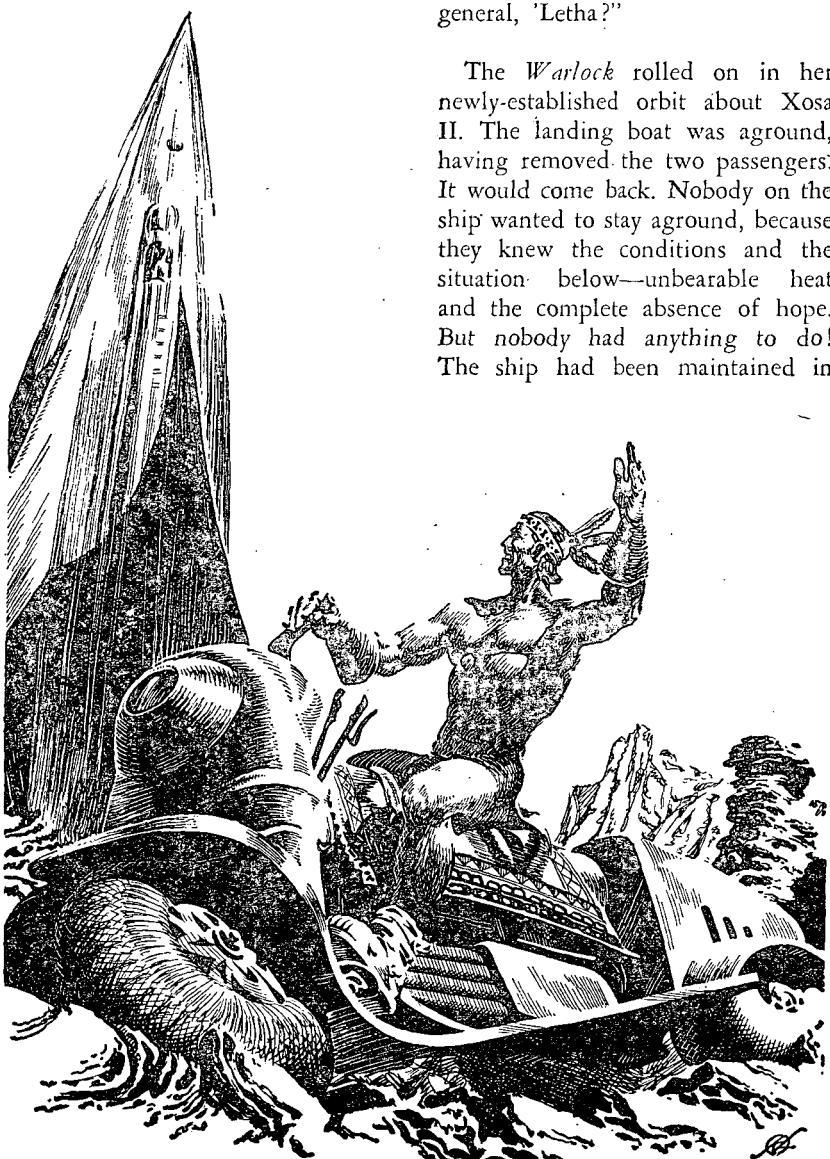
"How's Mike Thundercloud and Sally Whitehorse and the gang in general, 'Letha?"

The *Warlock* rolled on in her newly-established orbit about Xosa II. The landing boat was aground, having removed the two passengers. It would come back. Nobody on the ship wanted to stay aground, because they knew the conditions and the situation below—unbearable heat and the complete absence of hope. But nobody had anything to do! The ship had been maintained in



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standard operating condition during its two-months' voyage from Trent to here. No repairs or overhaulings were needed. There was no maintenance-work to speak of. There would be only stand-by watches until something happened. There would be nothing to do on those watches. There would be off-watch time for twenty-one out of every twenty-four hours, and no purposeful activity to fill even half an hour of it. In a matter of—probably—years, the *Warlock* should receive aid. She might be towed out of her orbit to space in which the Lawlor drive could function, or the crew might simply be taken off. But meanwhile, those on board were as completely frustrated as the colony. They could not do anything at all to help themselves.

In one fashion the crewmen were worse off than the colonists. The colonists had at least the colorful prospect of death before them. They could prepare for it in their several ways. But the members of the *Warlock*'s crew had nothing ahead but tedium.

The skipper faced the future with extreme, grim distaste.

The ride to the colony was torment. Aletha rode behind her cousin on the saddle-blanket, and apparently suffered little if at all. But Bordman could only ride in the ground-car's cargo space, along with the sack of mail from the ship. The ground was unbelievably rough and the jolting intolerable. The heat was literally murderous. In the metal cargo space, the temperature reached a hundred and sixty degrees in the sunshine—and given enough time, food will cook in no more heat than that. Of course a man has been known to enter an oven and stay there while a roast was cooked, and to come out alive. But the oven wasn't throwing him violently about or bringing sun-heated—blue-white-sun heated—metal to press his heat-suit against him.

The suit did make survival possible, but that was all. The contents of its canteens gave out just before arrival, and for a short time Bordman had only sweat for his suit to work with. It kept him alive by forced ventilation, but he arrived in a state of collapse. He drank the iced salt water they gave him and went to bed. He'd get back his strength with a proper sodium level in his blood. But he slept for twelve hours straight.

When he got up, he was physically normal again, but abysmally ashamed. It did no good to remind himself that Xosa II was rated minimum-comfort class D—a blue-white sun and a mean temperature of one hundred and ten degrees. Africans could take such a climate—with night-relief quarters. Amerinds could do steel construction work in the open, protected only by insulated shoes and gloves. But Bordman could not venture out-of-doors except in a heat-suit. He couldn't stay long then. It was not a weakness.

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It was a matter of genetics. But he was ashamed.

Aletha nodded to him when he found the Project Engineer's office. It occupied one of the hulls in which colony-establishment materials had been lowered by rocket power. There were forty of the hulls, and they had been emptied and arranged for inter-communication in three separate communities, so that an individual could change his quarters and ordinary associates from time to time and colony-fever—frantic irritation with one's companions—was minimized.

Aletha sat at a desk, busily making notes from a loose-leaf volume before her. The wall behind the desk was fairly lined with similar volumes.

"I made a spectacle of myself!" said Bordman, bitterly.

"Not at all!" Aletha assured him. "It could happen to anybody. I wouldn't do too well on Timbuk."

There was no answer to that. Timbuk was essentially a jungle planet, barely emerging from the carboniferous stage. Its colonists thrived because their ancestors had lived on the shores of the Gulf of Guinea, on Earth. But Anglos did not find its climate healthful, nor would many other races. Amerinds died there quicker than most.

"Ralph's on the way here now," added Aletha. "He and Dr. Chuka were out picking a place to leave the records. The sand dunes here are terrible, you know. When an explorer-ship does come to find out what's happened to us, these buildings could be covered up completely. Any place could be. It isn't easy to pick a record-cache that's quite sure to be found."

"When," said Bordman skeptically, "there's nobody left alive to point it out. Is that it?"

"That's it," agreed Aletha. "It's pretty bad all around. I didn't plan to die just yet."

Her voice was perfectly normal. Bordman snorted. As a senior Colonial Survey officer, he'd been around. But he'd never yet known a human colony to be extinguished when it was properly equipped and after a proper pre-settlement survey. He'd seen panic, but never real cause for a matter-of-fact acceptance of doom.

There was a clanking noise outside the hulk which was the Project Engineer's headquarters. Bordman couldn't see clearly through the filtered ports. He reached over and opened a door. The brightness outside struck his eyes like a blow. He blinked them shut instantly and turned away. But he'd seen a glistening, caterwheel ground car stopping not far from the doorway.

He stood wiping tears from his light-dazzled eyes as footsteps sounded outside. Aletha's cousin came in, followed by a huge man with remarkably dark skin. The dark man wore eyeglasses with a curiously thick, corklike nosepiece to insulate the necessary metal of the frame from his skin. It would blister if it touched bare flesh.

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"This is Dr. Chuka," said Redfeather pleasantly, "Mr. Bordman. Dr. Chuka's the director of mining and mineralogy here."

Bordman shook hands with the ebony-skinned man. He grinned, showing startlingly white teeth. Then he began to shiver.

"It's like a freeze-box in here," he said in a deep voice. "I'll get a robe and be with you."

He vanished through a doorway, his teeth chattering audibly. Aletha's cousin took half a dozen deliberate deep breaths and grimaced.

"I could shiver myself," he admitted "but Chuka's really acclimated to Xosa. He was raised on Timbuk."

Bordman said curtly:

"I'm sorry I collapsed on landing. It won't happen again. I came here to do a degree-of-completion survey that should open the colony to normal commerce, let the colonists' families move in, tourists, and so on. But I was landed by boat instead of normally, and I am told the colony is doomed. I would like an official statement of the degree of completion of the colony's facilities and an explanation of the unusual points I have just mentioned."

The Indian blinked at him. Then he smiled faintly. The dark man came back, zipping up an indoor warmth-garment. Redfeather dryly brought him up to date by repeating what Bordman had just said. Chuka grinned and sprawled comfortably in a chair.

"I'd say," he remarked humorously, in that astonishingly deep-toned voice of his, "sand got in our hair. And our colony. And the landing grid. There's a lot of sand on Xosa. Wouldn't you say that was the trouble?"

The Indian said with elaborate gravity:

"Of course wind had something to do with it."

Bordman fumed.

"I think you know," he said fretfully, "that as a senior Colonial Survey officer, I have authority to give any orders needed for my work. I give one now. I want to see the landing grid—if it is still standing. I take it that it didn't fall down?"

Redfeather flushed beneath the bronze pigment of his skin. It would be hard to offend a steelman more than to suggest that his work did not stand up.

"I assure you," he said politely, "that it did not fall down."

"Your estimate of its degree of completion?"

"Eighty per cent," said Redfeather formally.

"You've stopped work on it?"

"Work on it has been stopped," agreed the Indian.

"Even though the colony can receive no more supplies until it is completed?"

"Just so," said Redfeather without expression.

"Then I issue a formal order that I be taken to the landing-grid site immediately," said Bordman angrily. "I want to see what sort of incom-

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petence is responsible! Will you arrange it—at once?"

Redfeather said in a completely emotionless voice:

"You want to see the site of the landing grid. Very good. Immediately."

He turned and walked out into the incredible, blinding sunshine. Bordman blinked at the momentary blast of light, and then began to pace up and down the office. He fumed. He was still ashamed of his collapse from the heat during the travel from the landed rocket-boat to the colony. Therefore he was touchy and irritable. But the order he had given was strictly justifiable.

He heard a small noise. He whirled. Dr. Chuka, huge and black and spectacled, rocked back and forth in his seat, suppressing laughter.

"Now, what the devil does that mean?" demanded Bordman suspiciously. "It certainly isn't ridiculous to ask to see the structure on which the life of the colony finally depends!"

"Not ridiculous," said Dr. Chuka. "It's—hilarious!"

He boomed laughter in the office with the rounded ceiling of a remade robot hull. Aletha smiled with him, though her eyes were grave.

"You'd better put on a heat-suit," she said to Bordman.

He fumed again, tempted to defy all common sense because its dictates were not the same for everybody. But he marched away, back to the cubbyhole in which he had awakened. Angrily, he donned the heat-suit that had not protected him adequately before, but had certainly saved his life. He filled the canteens topping full—he suspected he hadn't done so the last time. He went back to the Project Engineer's office with a feeling of being burdened and absurd.

Out a filter-window, he saw that men with skins as dark as Dr. Chuka's were at work on a ground car. They were equipping it with a sunshade and curious shields like wings. Somebody pushed a sort of caterwheel handtruck toward it. They put big, heavy tanks into its cargo space. Dr. Chuka had disappeared, but Aletha was back at work making notes from the loose-leaf volume on the desk.

"May I ask," asked Bordman with some irony, "what your work happens to be just now?"

She looked up.

"I thought you knew," she said in surprise. "I'm here for the Amerind Historical Society. I can certify coups. I'm taking coup-records for the Society. They'll go in the record-cache Ralph and Dr. Chuka are arranging, so no matter what happens to the colony, the record of the coups won't be lost."

"Coups?" demanded Bordman. He knew that Amerinds painted feathers on the key-posts of steel structures they'd built, and he knew that the posting of such "coup-marks" was a cherished privilege and undoubtedly a survival or revival of some American Indian tra-

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dition back on Earth. But he did not know what they meant.

"Coups," repeated Aletha matter-of-factly. "Ralph wears three eagle-feathers. You saw them. He has three coups. Pinions, too! He built the landing grids on Norlath and— Oh, you don't know!"

"I don't," admitted Bordman, his temper not of the best because of what seemed unnecessary condescensions on Xosa II.

Aletha looked surprised.

"In the old days," she explained, "back on Earth, if a man scalped an enemy, he counted coup. The first to strike an enemy in a battle counted coup, too—a lesser one. Nowadays a man counts coups for different things, but Ralph's three eagle-feathers mean he's entitled to as much respect as a warrior in the old days who, three separate times, had killed and scalped an enemy warrior in the middle of his own camp. And he is, too!"

Bordman grunted.

"Barbarous, I'd say!"

"If you like," said Aletha. "But it's something to be proud of—and one doesn't count coup for making a lot of money!" Then she paused and said curtly: "The word 'snobbish' fits it better than 'barbarous.' We are snobs! But when the head of a clan stands up in Council in the Big Tepee on Algonka, representing his clan, and men have to carry the ends of the feather headdress with all the coups the members of his clan have earned—why one is proud to belong to that clan!" She added defiantly, "Even watching it on a vision-screen!"

Dr. Chuka opened the outer door. Blinding light poured in. He did not enter—and his body glistened with sweat.

"Ready for you, Mr. Bordman!"

Bordman adjusted his goggles and turned on the motors of his heat-suit. He went out the door.

The heat and light outside were oppressive. He darkened the goggles again and made his way heavily to the waiting, now-shaded ground car. He noted that there were other changes beside the sunshade. The cover-deck of the cargo space was gone, and there were cylindrical riding seats like saddles in the back. The odd lower shields reached out sidewise from the body, barely above the caterwheels. He could not make out their purpose and irritably failed to ask.

"All ready," said Redfeather coldly. "Dr. Chuka's coming with us. If you'll get in here, please—"

Bordman climbed awkwardly into the boxlike back of the car. He bestrode one of the cylindrical arrangements. With a saddle on it, it would undoubtedly have been a comfortable way to cover impossibly bad terrain in a mechanical carrier. He waited. About him there were the squatty hulls of the space-barges which had been towed here by a colony ship, each one once equipped with rockets for landing. Emptied of their cargoes, they had been huddled together into the three separate,

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adjoining communities. There were separate living quarters and mess halls and recreation rooms for each, and any colonist lived in the community of his choice and shifted at pleasure, or visited, or remained solitary. For mental health a man has to be assured of his free will, and over-regimentation is deadly in any society. With men psychologically suited to colonize, it is fatal.

Above—but at a distance, now—there was a monstrous scarp of mountains, colored in glaring and unnatural tints. Immediately about there was raw rock. But it was peculiarly smooth, as if sand grains had rubbed over it for uncountable aeons and carefully worn away every trace of unevenness. Half a mile to the left, dunes began and went away to the horizon. The nearer ones were small, but they gained in size with distance from the mountains—which evidently affected the surface-winds hereabouts—and the edge of seeing was visibly not a straight line. The dunes yonder must be gigantic. But of course on a world the size of ancient Earth, and which was waterless save for snow-patches at its poles, the size to which sand dunes could grow had no limit. The surface of Xosa II was a sea of sand, on which islands and small continents of wind-swept rock were merely minor features.

Dr. Chuka adjusted a small metal object in his hand. It had a tube dangling from it. He climbed into the cargo space and fastened it to one of the two tanks previously loaded.

"For you," he told Bordman. "Those tanks are full of compressed air at rather high pressure—a couple of thousand pounds. Here's a reduction-valve with an adiabatic expansion feature, to supply extra air to your heat-suit. It will be pretty cold, expanding from so high a pressure. Bring down the temperature a little more."

Bordman again felt humiliated. Chuka and Redfeather, because of their races, were able to move about nine-tenths naked in the open air on this planet, and they thrived. But he needed a special refrigerated costume to endure the heat. More, they provided him with sunshades and refrigerated air that they did not need for themselves. They were thoughtful of him. He was as much out of his element, where they fitted perfectly, as he would have been making a degree-of-completion survey on an underwater project. He had to wear what was practically a diving suit and use a special air supply to survive!

He choked down the irritation his own inadequacy produced.

"I suppose we can go now," he said as coldly as he could.

Aletha's cousin mounted the control-saddle—though it was no more than a blanket—and Dr. Chuka mounted beside Bordman. The ground car got under way. It headed for the mountains.

The smoothness of the rock was

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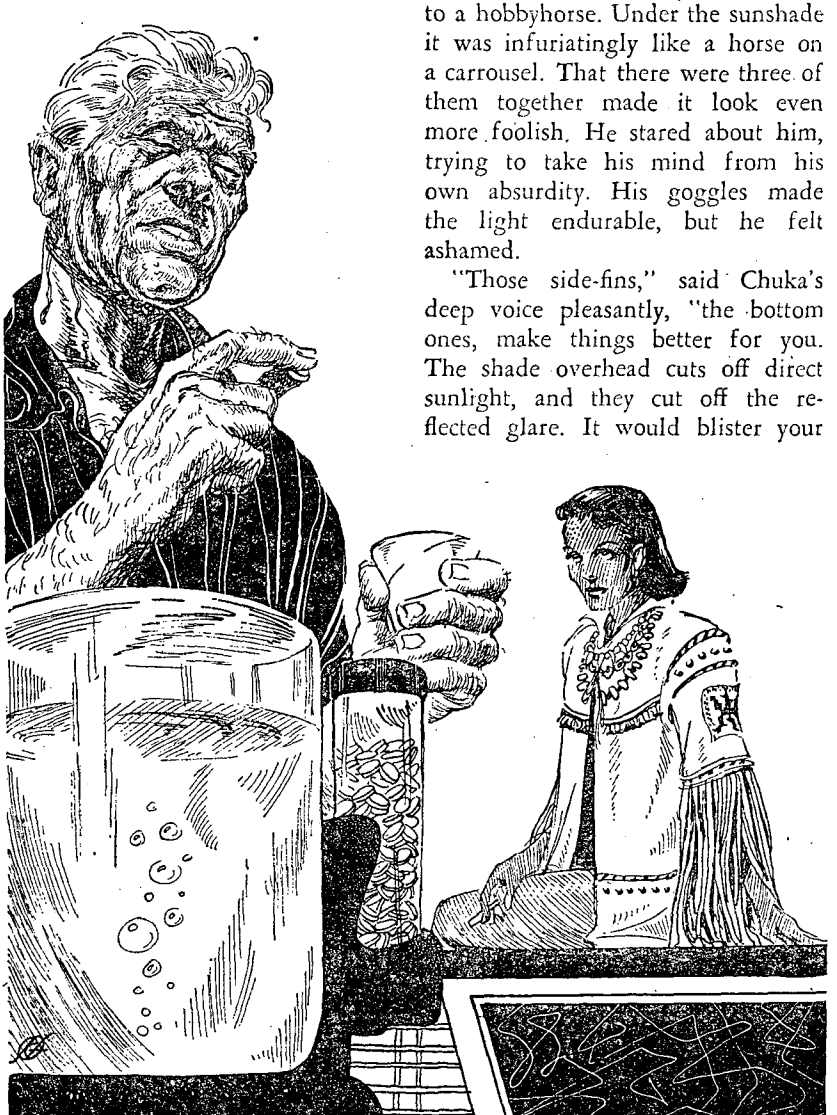
deceptive. The caterwheel car lurched and bumped and swayed and rocked. It rolled and dipped and wallowed. Nobody could have remained in a normal seat on such terrain, but Bordman felt hopelessly undignified riding what amounted to a hobbyhorse. Under the sunshade it was infuriatingly like a horse on a carrousel. That there were three of them together made it look even more foolish. He stared about him, trying to take his mind from his own absurdity. His goggles made the light endurable, but he felt ashamed.

"Those side-fins," said Chuka's deep voice pleasantly, "the bottom ones, make things better for you. The shade overhead cuts off direct sunlight, and they cut off the reflected glare. It would blister your



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skin even if the sun never touched you directly."

Bordman did not answer. The caterwheel car went on. It came to a patch of sand—tawny sand, heavily mineralized. There was a dune here. Not a big one for Xosa II. It was no more than a hundred feet high. But they went up its leeward, steeply slanting side. All the planet seemed to tilt insanely as the caterwheels spun. They reached the dune's crest, where it tended to curl over and break like a water-comber, and here the wheels struggled with sand precariously ready to fall, and Bordman had a sudden perception of the sands of Xosa II as the oceans that they really were. The dunes were waves which moved with infinite slowness, but the irresistible force of storm-seas. Nothing could resist them. Nothing!

They traveled over similar dunes for two miles. Then they began to climb the approaches to the mountains. And Bordman saw for the second time—the first had been through the ports of the landing-boat—where there was a notch in the mountain wall and sand had flowed out of it like a waterfall, making a beautifully symmetrical cone-shaped heap against the lower cliffs. There were many such falls. There was one place where there was a sand-cascade. Sand had poured over a series of rocky steps, piling up on each in turn to its very edge, and then spilling again to the next.

They went up a crazily slanting spur of stone, whose sides were too steep for sand to lodge on, and whose narrow crest had a bare thin coating of powder.

The landscape looked like a nightmare. As the car went on, wabbling and lurching and dipping on its way, the heights on either side made Bordman tend to dizziness. The coloring was impossible. The aridness, the dessication, the lifelessness of everything about was somehow shocking. Bordman found himself straining his eyes for the merest, scrubbiest of bushes and for however stunted and isolated a wisp of grass.

The journey went on for an hour. Then there came a straining climb up a now-windswept ridge of eroded rock, and the attainment of its highest point. The ground car went onward for a hundred yards and stopped.

They had reached the top of the mountain range, and there was doubtlessly another range beyond. But they could not see it. Here, at the place to which they had climbed so effortfully, there were no more rocks. There was no valley. There was no descending slope. There was sand. This was one of the sand plateaus which were a unique feature of Xosa II. And Bordman knew, now, that the disputed explanation was the true one.

Winds, blowing over the mountains, carried sand as on other worlds they carried moisture and pollen and seeds and rain. Where two mountain ranges ran across the course of long-blowing winds, the winds

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eddied above the valley between. They dropped sand into it. The equivalent of trade winds, Bordman considered, in time would fill a valley to the mountain tops, just as trade winds provide moisture in equal quantity on other worlds, and civilizations have been built upon it. But—

"Well?" said Bordman challengingly.

"This is the site of the landing grid," said Redfeather.

"Where?"

"Here," said the Indian dryly. "A few months ago there was a valley here. The landing grid had eighteen hundred feet of height built. There was to be four hundred feet more—the lighter top construction justifies my figure of eighty per cent completion. Then there was a storm."

It was hot. Horribly, terribly hot, even here on a plateau at mountain-top height. Dr. Chuka looked at Bordman's face and bent down in the vehicle. He turned a stopcock on one of the air tanks brought for Bordman's necessity. Immediately Bordman felt cooler. His skin was dry, of course. The circulated air dried sweat as fast as it appeared. But he had the dazed, feverish feeling of a man in an artificial-fever box. He'd been fighting it for some time. Now the coolness of the expanded air was almost deliriously refreshing.

Dr. Chuka produced a canteen. Bordman drank thirstily. The water was slightly salted to replace salt lost in sweat.

"A storm, eh?" asked Bordman, after a time of contemplation of his inner sensations as well as the scene of disaster before him. There'd be some hundreds of millions of tons of sand in even a section of this plateau. It was unthinkable that it could be removed except by a long-time sweep of changed trade winds along the length of the valley. "But what has a storm to do—"

"It was a sandstorm," said Redfeather coldly. "Probably there was a sunspot flare-up. We don't know. But the pre-colonization survey spoke of sandstorms. The survey team even made estimates of sandfall in various places as so many inches per year. Here all storms drop sand instead of rain. But there must have been a sunspot flare because this storm blew for"—his voice went flat and deliberate because it was stating the unbelievable—"for two months. We did not see the sun in all that time. And we couldn't work, naturally. The sand would flay a man's skin off his body in minutes. So we waited it out.

"When it ended, there was this sand plateau where the survey had ordered the landing grid to be built. The grid was under it. It is under it. The top of eighteen hundred feet of steel is still buried two hundred feet down in the sand you see. Our unfabricated building-steel is piled ready for erection—under two thousand feet of sand. Without anything but stored power it is hardly practi-

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cal"—Redfeather's tone was sardonic—"for us to try to dig it out. There are hundreds of millions of tons of stuff to be moved. If we could get the sand away, we could finish the grid. If we could finish the grid, we'd have power enough to get the sand away—in a few years, and if we could replace the machinery that wore out handling it. And if there wasn't another sandstorm."

He paused. Bordman took deep breaths of the cooler air. He could think more clearly.

"If you will accept photographs," said Redfeather politely, "you can check that we actually did the work."

Bordman saw the implications. The colony had been formed of Amerinds for the steel work and Africans for the labor the Amerinds were congenitally averse to—the handling of complex mining-machinery underground and the control of modern high-speed smelting operations. Both races could endure this climate and work in it—provided that they had cooled sleeping quarters. But they had to have power. Power not only to work with, but to live by. The air-cooling machinery that made sleep possible also condensed from the cooled air the minute trace of water vapor it contained and that they needed for drink. But without power they would thirst. Without the landing grid and the power it took from the ionosphere, they could not receive supplies from the rest of the universe. So they would starve.

And the *Warlock,* now in orbit somewhere overhead, was well within the planet's gravitational field and could not use its Lawlor drive to escape with news of their predicament. In the normal course of events it would be years before a colony ship capable of landing or blasting out of a planetary gravitational field by rocket-power was dispatched to find out why there was no news from Xosa II. There was no such thing as interstellar signaling, of course. Ships themselves travel faster than any signal that could be sent, and distances were so great that mere communication took enormous lengths of time. A letter sent to Earth from the Rim even now took ten years to make the journey, and another ten for a reply. Even the much shorter distances involved in Xosa II's predicament still ruled out all hope. The colony was strictly on its own.

Bordman said heavily:

"I'll accept the photographs. I even accept the statement that the colony will die. I will prepare my report for the cache Aletha tells me you're preparing. And I apologize for any affront I may have offered you."

Dr. Chuka nodded approvingly. He regarded Bordman with benign warmth. Ralph Redfeather said cordially enough:

"That's perfectly all right. No harm done."

"And now," said Bordman short-

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ly, "since I have authority to give any orders needed for my work, I want to survey the steps you've taken to carry out those parts of your instructions dealing with emergencies. I want to see right away what you've done to beat this state of things. I know they can't be beaten, but I intend to leave a report on what you've tried!"

The *Warlock* swung in emptiness around the planet Xosa II. It was barely five thousand miles above the surface, so the mottled terrain of the dry world flowed swiftly and perpetually beneath it. It did not seem beneath, of course. It simply seemed out—away—removed from the ship. And in the ship's hull there was artificial gravity, and light, and there were the humming sounds of fans which kept the air in motion and flowing through the air apparatus. Also there was food, and adequate water, and the temperature was admirably controlled. But nothing happened. Moreover, nothing could be expected to happen. There were eight men in the crew, and they were accustomed to space-voyages which lasted from one month to three. But they had traveled a good two months from their last port. They had exhausted the visireels, playing them over and over until they were intolerable. They had read and reread all the bookreels they could bear. On previous voyages they had played chess and similar games until it was completely predictable who would beat whom in every possible contest.

Now they viewed the future with bitterness. The ship could not land, because there was no landing grid in operation on the planet below them. They could not depart, because the Lawlor drive simply does not work within five diameters of an Earth-gravity planet. Space is warped only infinitesimally by so thin a field, but a Lawlor drive needs almost perfectly unstressed emptiness if it is to take hold. They did not have fuel enough to blast out the necessary thirty-odd thousand miles against gravity. The same consideration made their lifeboats useless. They could not escape by rocket-power and their Lawlor drives, also, were ineffective.

The crew of the *Warlock* was bored. The worst of the boredom was that it promised to last without limit. They had food and water and physical comfort, but they were exactly in the situation of men sentenced to prison for an unknown but enormous length of time. There was no escape. There could be no alleviation. The prospect invited frenzy by anticipation.

A fist fight broke out in the crew's quarters within two hours after the *Warlock* had established its orbit—as a first reaction to their catastrophe. The skipper went through the ship and painstakingly confiscated every weapon. He locked them up. He, himself, already felt the nagging effect of jangling nerves. There was nothing to do. He didn't know when

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there would ever be anything to do. It was a condition to produce hysteria.

There was night. Outside and above the colony there were uncountable myriads of stars. They were not the stars of Earth, of course, but Bordman had never been on Earth. He was used to unfamiliar constellations. He stared out a port at the sky, and noted that there were no moons. He remembered, when he thought, that Xosa II had no moons. There was a rustling of paper behind him. Aletha Redfeather turned a page in a loose-leaf volume and painstakingly made a note. The wall behind her held many more such books. From them could be extracted the detailed history of every bit of work that had been done by the colony-preparation crews. Separate, tersely-phrased items could be assembled to make a record of individual men.

There had been incredible hardships, at first. There were heroic feats. There had been an attempt to ferry water supplies down from the pole by aircraft. It was not practical, even to build up a reserve of fluid. Winds carried sand particles here as on other worlds they carried moisture. Aircraft were abraded as they flew. The last working flier made a forced landing five hundred miles from the colony. A caterwheel expedition went out and brought the crew in. The caterwheel trucks were armored with silicone plastic, resistant to abrasion, but when they got back they had to be scrapped. There had been men lost in sudden sandsqualls, and heroic searches for them, and once or twice rescues. There had been cave-ins in the mines. There had been accidents. There had been magnificent feats of endurance and achievement.

Bordman went to the door of the hull which was Ralph Redfeather's Project Engineer office. He opened it. He stepped outside.

It was like stepping into an oven. The sand was still hot from the sunshine just ended. The air was so utterly dry that Bordman instantly felt it sucking at the moisture of his nasal passages. In ten seconds his feet—clad in indoor footwear—were uncomfortably hot. In twenty the soles of his feet felt as if they were blistering. He would die of the heat at night, here! Perhaps he could endure the outside near dawn, but he raged a little. Here where Amerinds and Africans lived and throve, he could live unprotected for no more than an hour or two—and that at one special time of the planet's rotation!

He went back in, ashamed of the discomfort of his feet and angrily letting them feel scorched rather than admit to it.

Aletha turned another page.

"Look, here!' said Bordman angrily. "No matter what you say, you're going to go back on the *Warlock* before—"

She raised her eyes.

"We'll worry about that when the

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time comes. But I think not. I'd rather stay here."

"For the present, perhaps," snapped Bordman. "But before things get too bad you go back to the ship! They've rocket fuel enough for half a dozen landings of the landing boat. They can lift you out of here!"

Aletha shrugged.

"Why leave here to board a derelect? The *Warlock*'s practically that. What's your honest estimate of the time before a ship equipped to help us gets here?"

Bordman would not answer. He'd done some figuring. It had been a two-month journey from Trent—the nearest Survey base—to here. The *Warlock* had been expected to remain aground until the smelter it brought could load it with pig metal. Which could be as little as two weeks, but would surprise nobody if it was two months instead. So the ship would not be considered due back on Trent for four months. It would not be considered overdue for at least two more. It would be six months before anybody seriously wondered why it wasn't back with its cargo. There'd be a wait for lifeboats to come in, should there have been a mishap in space. There'd eventually be a report of noncommunication to the Colony Survey headquarters on Canna III. But it would take three months for that report to be received, and six more for a confirmation—even if ships made the voyages exactly at the most favorable intervals—and then there should at least be a complaint from the colony. There were lifeboats aground on Xosa II, for emergency communication, and if a lifeboat didn't bring news of a planetary crisis, no crisis would be considered to exist. Nobody could imagine a landing grid failing!

Maybe in a year somebody would think that maybe somebody ought to ask around about Xosa II. It would be much longer before somebody put a note on somebody else's desk that would suggest that when, or if, a suitable ship passed near Xosa II, or if one should be available for the inquiry, it might be worth while to have the noncommunication from the planet looked into. Actually, to guess at three years before another ship arrived would be the most optimistic of estimates.

"You're a civilian," said Bordman shortly. "When the food and water run low, you go back to the ship. You'll at least be alive when somebody does come to see what's the matter here!"

Aletha said mildly:

"Maybe I'd rather not be alive. Will you go back to the ship?"

Bordman flushed. He wouldn't. But he said doggedly:

"I can order you sent on board, and your cousin will carry out the order!"

"I doubt it very much," said Aletha pleasantly.

She returned to her task.

There were crunching footsteps outside the hulk. Bordman winced a little. With insulated sandals, it

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was normal for these colonists to move from one part of the colony to another in the open, even by daylight. He, Bordman, couldn't take out-of-doors at night! His lips twisted bitterly.

Men came in. There were dark men with rippling muscles under glistening skin, and bronze Amerinds with coarse straight hair. Ralph Redfeather was with them. Dr. Chuka came in last of all.

"Here we are," said Redfeather. "These are our foremen. Among us, I think we can answer any questions you want to ask."

He made introductions. Bordman didn't try to remember the names. Abeokuta and Northwind and Sutata and Tallgrass and T'ckka and Spottedhorse and Lewanika— They were names which in combination would only be found in a very raw, new colony. But the men who crowded into the office were wholly at ease, in their own minds as well as in the presence of a senior Colonial Survey officer. They nodded as they were named, and the nearest shook hands. Bordman knew that he'd have liked their looks under other circumstances. But he was humiliated by the conditions on this planet. They were not. They were apparently only sentenced to death by them.

"I have to leave a report," said Bordman curtly—and he was somehow astonished to know that he did expect to leave a report rather than make one; he accepted the hopelessness of the colony's future—"on the degree-of-completion of the work here. But since there's an emergency, I have also to leave a report on the measures taken to meet it."

The report would be futile, of course. As futile as the coup-records Aletha was compiling, which would be read only after everybody on the planet was dead. But Bordman knew he'd write it. It was unthinkable that he shouldn't.

"Redfeather tells me," he added, again curtly, "that the power in storage can be used to cool the colony buildings—and therefore condense drinking water from the air—for just about six months. There is food for about six months. If one lets the buildings warm up a little, to stretch the fuel, there won't be enough water to drink. Go on half rations to stretch the food, and there won't be enough water to last and the power will give out anyhow. No profit there!"

There were nods. The matter had been thrashed out long before.

"There's food in the *Warlock* overhead," Bordman went on coldly, "but they can't use the landing boat more than a few times. It can't use ship fuel. No refrigeration to hold it stable. They couldn't land more than a ton of supplies all told. There are five hundred of us here. No help there!"

He looked from one to another.

"So we live comfortably," he told them with irony, "until our food and water and minimum night-comfort run out together. Anything we do to try to stretch anything is useless because of what happens to

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something else. Redfeather tells me you accept the situation. What are you doing—since you accept it?"

Dr. Chuka said amiably:

"We've picked a storage place for our records, and our miners are blasting out space in which to put away the record of our actions to the last possible moment. It will be sand-proof. Our mechanics are building a broadcast unit we'll spare a tiny bit of fuel for. It will run twenty-odd years, broadcasting directions so it can be found regardless of how the terrain is changed by drifting sand."

"And," said Bordman, "the fact that nobody will be here to give directions."

Chuka added benignly:

"We're doing a great deal of singing, too. My people are . . . ah . . . religious. When we are . . . ah . . . no longer here . . . there have been boastings that there'll be a well-practiced choir ready to go to work in the next world."

White teeth showed in grins. Bordman was almost envious of men who could grin at such a thought. But he went on grimly:

"And I understand that athletics have also been much practiced."

Redfeather said:

"There's been time for it. Climbing teams have counted coup on all the worst mountains within three hundred miles. There's been a new record set for the javelin, adjusted for gravity constant, and Johnny Cornstalk did a hundred yards in eight point four seconds. Aletha has the records and has certified them."

"Very useful!" said Bordman sardonically. Then he disliked himself for saying it even before the bronze-skinned men's faces grew studiedly impassive.

Chuka waved his hand.

"Wait, Ralph! Lewanika's nephew will beat that within a week!"

Bordman was ashamed again because Chuka had spoken to cover up his own ill-nature.

"I take it back!" he said irritably. "What I said was uncalled for. I shouldn't have said it! But I came here to do a completion survey and what you've been giving me is material for an estimate of morale! It's not my line! I'm a technician, first and foremost! We're faced with a technical problem!"

Aletha spoke suddenly from behind him.

"But these are men, first and foremost, Mr. Bordman. And they're faced with a very human problem—how to die well. They seem to be rather good at it, so far."

Bordman ground his teeth. He was again humiliated. In his own fashion he was attempting the same thing. But just as he was genetically not qualified to endure the climate of this planet, he was not prepared for a fatalistic or pious acceptance of disaster. Amerind and African, alike, these men instinctively held to their own ideas of what the dignity of a man called upon him to do when he could not do anything but die. But Bordman's idea of his human dignity required him to be still fighting: still scratching at the eyes of fate or

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destiny when he was slain. It was in his blood or genes or the result of training. He simply could not, with self-respect, accept any physical situation as hopeless even when his mind assured him that it was.

"I agree," he said coldly, "but still I have to think in technical terms. You might say that we are going to die because we cannot land the *Warlock* with food and equipment. We cannot land the *Warlock* because we have no landing grid. We have no landing grid because it and all the material to complete it is buried under millions of tons of sand. We cannot make a new light-supply-ship type of landing grid because we have no smelter to make beams, nor power to run it if we had, yet if we had the beams we could get the power to run the smelter we haven't got to make the beams. And we have no smelter, hence no beams, no power, no prospect of food or help because we can't land the *Warlock*. It is strictly a circular problem. Break it at any point and all of it is solved."

One of the dark men muttered something under his breath to those near him. There were chuckles.

"Like Mr. Woodchuck," explained the man, when Bordman's eyes fell on him. "When I was a little boy there was a story like that."

Bordman said icily:

"The problem of coolness and water and food is the same sort of problem. In six months we could raise food—if we had power to con-

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dense moisture. We've chemicals for hydroponics—if we could keep the plants from roasting as they grew. Refrigeration and water and food are practically another circular problem."

Aletha said tentatively:

"Mr. Bordman—"

He turned, annoyed. Aletha said almost apologetically:

"On Chagan there was a—you might call it a woman's coup given to a woman I know. Her husband raises horses. He's mad about them. And they live in a sort of home on caterwheels out on the plains—the llanos. Sometimes they're months away from a settlement. And she loves ice cream and refrigeration isn't too simple. But she has a Doctorate in Human History. So she had her husband make an insulated tray on the roof of their trailer and she makes her ice cream there."

Men looked at her. Her cousin said amusedly:

"That should rate some sort of technical-coup feather!"

"The Council gave her a brass pot—official," said Aletha. "Domestic science achievement." To Bordman she explained: "Her husband put a tray on the roof of their house, insulated from the heat of the house below. During the day there's an insulated cover on top of it, insulating it from the heat of the sun. At night she takes off the top cover and pours her custard, thin, in the tray. Then she goes to bed. She has to get up before daybreak to scrape it up, but by then the ice cream is frozen. Even on a warm night." She looked from one to another. "I don't know why. She said it was done in a place called Babylonia on Earth, many thousands of years ago."

Bordman blinked. Then he said decisively:

"Damn! Who knows how much the ground-temperature drops here before dawn?"

"I do," said Aletha's cousin, mildly. "The top-sand temperature falls forty-odd degrees. Warmer underneath, of course. But the air here is almost cool when the sun rises. Why?"

"Nights are cooler on all planets," said Bordman, "because every night the dark side radiates heat to empty space. There'd be frost everywhere every morning if the ground didn't store up heat during the day. If we prevent daytime heat-storage—cover a patch of ground before dawn and leave it covered all day—and uncover it all night while shielding it from warm winds— We've got refrigeration! The night sky is empty space itself! Two hundred and eighty below zero!"

There was a murmur. Then argument. The foremen of the Xosa II colony-preparation crew were strictly practical men, but they had the habit of knowing why some things were practical. One does not do modern steel construction in contempt of theory, nor handle modern mining tools without knowing why as well as how they work. This proposal sounded like something that was

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based on reason—that should work to some degree. But how well? Anybody could guess that it should cool something at least twice as much as the normal night temperature-drop. But somebody produced a slipstick and began to juggle it expertly. He astonishedly announced his results. Others questioned, and then verified it. Nobody paid much attention to Bordman. But there was a hum of absorbed discussion, in which Redfeather and Chuka were immediately included. By calculation, it astoundingly appeared that if the air on Xosa II was really as clear as the bright stars and deep day-sky color indicated, every second night a total drop of one hundred and eighty degrees temperature could be secured by radiation to interstellar space—if there were no convection-currents, and they could be prevented by—

It was the convection-current problem which broke the assembly into groups with different solutions. But it was Dr. Chuka who boomed at all of them to try all three solutions and have them ready before daybreak, so the assembly left the hulk, still disputing enthusiastically. But somebody had recalled that there were dewponds in the one arid area on Timbuk, and somebody else remembered that irrigation on Delmos III was accomplished that same way. And they recalled how it was done—

Voices went away in the ovenlike night outside. Bordman grimaced, and again said:

"Damn! Why didn't I think of that myself?"

"Because," said Aletha, smiling, "you aren't a Doctor of Human History with a horse-raising husband and a fondness for ice cream. Even so, a technician was needed to break down the problem here into really simple terms." Then she said, "I think Bob Running Antelope might approve of you, Mr. Bordman."

Bordman fumed to himself.

"Who's he? Just what does that whole comment mean?"

"I'll tell you," said Aletha, "when you've solved one or two more problems."

Her cousin came back into the room. He said with gratification:

"Chuka can turn out silicone-wool insulation, he says. Plenty of material, and he'll use a solar mirror to get the heat he needs. Plenty of temperature to make silicones! How much area will we need to pull in four thousand gallons of water a night?"

"How do I know?" demanded Bordman. "What's the moisture-content of the air here, anyhow?" Then he said vexedly, "Tell me! Are you using heat-exchangers to help cool the air you pump into the buildings, before you use power to refrigerate it? It would save some power—"

The Indian project engineer said absorbedly:

"Let's get to work on this! I'm a steel man myself, but—"

They settled down. Aletha turned a page.

The *Warlock* spun around the planet. The members of its crew

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withdrew into themselves. In even two months of routine tedious voyaging to this planet there had been the beginnings of irritation with the mannerisms of other men. Now there would be years of it. At the beginning, every man tended to become a hermit so that he could postpone as long as possible the time when he would hate his shipmates. Monotony was already so familiar that its continuance was a foreknown evil. The crew of the *Warlock* already knew how intolerable they would presently be to each other, and the forcknowledge tended to make them intolerable now.

Within two days of its establishment in orbit, the *Warlock* was manned by men already morbidly resentful of fate; with the psychology of prisoners doomed to close confinement for an indeterminate but ghastly period. On the third day there was a second fist fight. A bitter one.

Fist fights are not healthy symptoms in a spaceship which cannot hope to make port for a matter of years.

Most human problems are circular and fall apart when a single trivial part of them is solved. There used to be enmity between races because they were different, and they tended to be different because they were enemies, so there was enmity—The big problem of interstellar flight was that nothing could travel faster than light, and nothing could travel faster than light because mass increased with speed, and mass increased with speed—obviously!—because ships remained in the same time-slot, and ships remained in the same time-slot long after a one-second shift was possible because nobody realized that it meant traveling faster than light. And even before there was interstellar travel, there was practically no interplanetary commerce because it took so much fuel to take off and land. And it took more fuel to carry the fuel to take off and land, and more still to carry the fuel for that, until somebody used power on the ground for heave-off instead of take-off, and again on the ground for landing. And then interplanetary ships carried cargoes. And on Xosa II there was an emergency because a sandstorm had buried the almost completed landing grid under some megatons of sand, and it couldn't be completed because there was only storage power because it wasn't completed, because there was only storage power because—

But it took three weeks for the problem to be seen as the ultimately simple thing it really was. Bordman had called it a circular problem, but he hadn't seen its true circularity. It was actually—like all circular problems—inherently an unstable set of conditions. It began to fall apart when he saw that mere refrigeration would break its solidity.

In one week there were ten acres of desert covered with silicone-woolfelt in great strips. By day a reflective surface was uppermost, and at

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sundown caterwheel trucks hooked on to towlines and neatly pulled it over on its back, to expose gridded black-body surfaces to the starlight. And the gridding was precisely designed so that winds blowing across it did not make eddies in the grid-squares, and the chilled air in those pockets remained undisturbed and there was no conduction of heat downward by eddy currents, while there was admirable radiation of heat out to space. And this was in the manner of the night sides of all planets, only somewhat more efficient.

In two weeks there was a water yield of three thousand gallons per night, and in three weeks more there were similar grids over the colony houses and a vast roofed cooling-shed for pre-chilling of air to be used by the refrigeration systems themselves. The fuel-store—stored power—was thereupon stretched to three times its former calculated usefulness. The situation was no longer a simple and neat equation of despair.

Then something else happened. One of Dr. Chuka's assistants was curious about a certain mineral. He used the solar furnace that had made the silicone wool to smelt it. And Dr. Chuka saw him. And after one blank moment he bellowed laughter and went to see Ralph Redfeather. Whereupon Amerind steel-workers sawed apart a robot hull that was no longer a fuel tank because its fuel was gone, and they built a demountable solar mirror some sixty feet across—which African mechanics deftly powered—and suddenly there was a spot of incandescence even brighter than the sun of Xosa II, down on the planet's surface. It played upon a mineral cliff, and monstrous smells developed and even the African mining-technicians put on goggles because of the brightness, and presently there were threads of molten metal and slag trickling—and separating as they trickled—hesitantly down the cliff-side.

And Dr. Chuka beamed and slapped his sweating thighs, and Bordman went out in a caterwheel truck, wearing a heat-suit, to watch it for all of twenty minutes. When he got back to the Project Engineer's office he gulped iced salt water and dug out the books he'd brought down from the ship. There was the spec-book for Xosa II, and there were the other volumes of definitions issued by the Colonial Survey. They were definitions of the exact meanings of terms used in briefer specifications, for items of equipment sometimes ordered by the Colony Office.

When Chuka came into the office, presently, he carried the first crude pig of Xosa II iron in his gloved hand. He gloated. Bordman was then absent, and Ralph Redfeather worked feverishly at his desk.

"Where's Bordman?" demanded Chuka in that resonant bass voice of his. "I'm ready to report for degree-of-completion credit that the mining

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properties on Xosa II are prepared as of today to deliver pig iron, cobalt, zirconium and beryllium in commercial quantities! We require one day's notice to begin delivery of metal other than iron at the moment, because we're short of equipment, but we can furnish chromium and manganese on two days' notice —the deposits are farther away."

He dumped the pig of metal on the second desk, where Aletha sat with her perpetual loose-leafed volumes before her. The metal smoked and began to char the desk-top. He picked it up again and tossed it from one gloved hand to the other.

"There y'are, Ralph!" he boasted. "You Indians go after your coups! Match this coup for me! Without fuel and minus all equipment except of our own making—I credit an assist on the mirror, but that's all—we're set to load the first ship that comes in for cargo! Now what are you going to do for the record? I think we've wiped your eye for you!".

Ralph hardly looked up. His eyes were very bright. Bordman had shown him and he was copying feverishly the figures and formulae from a section of the definition book of the Colonial Survey. The books started with the specifications for antibiotic growth equipment for colonies with problems in local bacteria. It ended with definitions of the required strength-of-material and the designs stipulated for cages in zoos for motile fauna, subdivided into flying, marine, and solid-ground creatures: sub-sub-divided into carnivores, herbivores, and omnivores, with the special specifications for enclosures to contain abyssal creatures requiring extreme pressures, and the equipment for maintaining a healthfully re-poisoned atmosphere for creatures from methane planets.

Redfeather had the third volume open at, "Landing Grids, Lightest Emergency, Commerce Refuges, For Use Of." There were some dozens of non-colonized planets along the most-traveled spaceways on which refuges for shipwrecked spacemen were maintained. Small forces of Patrol personnel manned them. Space lifeboats serviced them. They had the minimum installations which could draw on their planets' ionospheres for power, and they were not expected to handle anything bigger than a twenty-ton lifeboat. But the specifications for the equipment of such refuges were included in the reference volumes for Bordman's use in the making of Colonial surveys. They were compiled for the information of contractors who wanted to bid on Colonial Survey installations, and for the guidance of people like Bordman who checked up on the work. So they contained all the data for the building of a landing grid, lightest emergency, commerce refuge for use of, in case of need. Redfeather copied feverishly.

Chuka ceased his boasting, but still he grinned.

"I know we're stuck, Ralph," he

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said amiably, "but it's nice stuff to go in the records. Too bad we don't keep coup-records like you Indians!"

Aletha's cousin—Project Engineer—said crisply:

"Go away! Who made your solar mirror? It was more than an assist! You get set to cast beams for us! Girders! I'm going to get a lifeboat aloft and away to Trent! Build a minimum size landing grid! Build a fire under somebody so they'll send us a colony ship with supplies! If there's no new sandstorm to bury the radiation refrigerators Bordman brought to mind, we can keep alive with hydroponics until a ship can arrive with something useful!"

Chuka stared.

"You don't mean we might actually live through this! Really?"

Aletha regarded the two of them with impartial irony.

"Dr. Chuka," she said gently, "you accomplished the impossible. Ralph, here, is planning to attempt the preposterous. Does it occur to you that Mr. Bordman is nagging himself to achieve the inconceivable? It is inconceivable, even to him, but he's trying to do it!"

"What's he trying to do?" demanded Chuka, wary but amused.

"He's trying," said Aletha, "to prove to himself that he's the best man on this planet. Because he's physically least capable of living here! His vanity's hurt. Don't underestimate him!"

"He the best man here?" demanded Chuka blankly. "In his way he's all right. The refrigeration proves that! But he can't walk out-of-doors without a heat-suit!"

Ralph Redfeather said dryly, without ceasing his feverish work:

"Nonsense, Aletha. He has courage. I give him that. But he couldn't walk a beam twelve hundred feet up. In his own way, yes. He's capable. But the best man—"

"I'm sure," agreed Aletha, "that he couldn't sing as well as the worst of your singing crew, Dr. Chuka, and any Amerind could outrun him. Even I could! But he's got something we haven't got, just as we have qualities he hasn't. We're secure in our competences. We know what we can do, and that we can do it better than any—" her eyes twinkled—"paleface. But he doubts himself. All the time and in every way. And that's why he may be the best man on this planet! I'll bet he does prove it!"

Redfeather said scornfully:

"You suggested radiation refrigeration! What does it prove that he applied it?"

"That," said Aletha, "he couldn't face the disaster that was here without trying to do something about it—even when it was impossible. He couldn't face the deadly facts. He had to torment himself by seeing that they wouldn't be deadly if only this one or that or the other were twisted a little. His vanity was hurt because nature had beaten men. His dignity was offended. And a man with easily-hurt dignity won't ever be happy, but he can be pretty good!"

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Chuka raised his ebony bulk from the chair in which he still shifted the iron pig from gloved hand to gloved hand.

"You're kind," he said, chuckling. "Too kind! I don't want to hurt his feelings. I wouldn't, for the world! But really . . . I've never heard a man praised for his vanity before, or admired for being touchy about his dignity! If you're right . . . why . . . it's been convenient. It might even mean hope. But . . . hm-m-m— Would you want to marry a man like that?"

"Great Manitou forbid!" said Aletha firmly. She grimaced at the bare idea. "I'm an Amerind. I'll want my husband to be contented. I want to be contented along with him. Mr. Bordman will never be either happy or content. No pale-face husband for me! But I don't think he's through here yet. Sending for help won't satisfy him. It's a further hurt to his vanity. He'll be miserable if he doesn't prove himself—to himself—a better man than that!"

Chuka shrugged his massive shoulders. Redfeather tracked down the last item he needed and fairly bounced to his feet.

"What tonnage of iron can you get out, Chuka?" he demanded. "What can you do in the way of castings? What's the elastic modulus —how much carbon in this iron? And when can you start making castings? Big ones?"

"Let's go talk to my foremen," said Chuka complacently. "We'll see how fast my . . . ah . . . mineral spring is trickling metal down the cliff-face. If you can really launch a lifeboat, we might get some help here in a year and a half instead of five—"

They went out-of-doors together. There was a small sound in the next office. Aletha was suddenly very, very still. She sat motionless for a long half-minute. Then she turned her head.

"I owe you an apology, Mr. Bordman," she said ruefully. "It won't take back the discourtesy, but—I'm very sorry."

Bordman came into the office from the next room. He was rather pale. He said wryly:

"Eavesdroppers never hear good of themselves, eh? Actually I was on the way in here when I heard— references to myself it would embarrass Chuka and your cousin to know I heard. So I stopped. Not to listen, but to keep them from knowing I'd heard their private opinions of me. I'll be obliged if you don't tell them. They're entitled to their opinions of me. I've mine of them." He added grimly, "Apparently I think more highly of them than they do of me!"

Aletha said contritely:

"It must have sounded horrible! But they . . . we . . . all of us think better of you than you do of yourself!"

Bordman shrugged.

"You in particular. Would you

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marry someone like me? Great Manitou, no!"

"For an excellent reason," said Aletha firmly. "When I get back from here—*if* I get back from here—I'm going to marry Bob Running Antelope. He's nice. I like the idea of marrying him. I want to! But I look forward not only to happiness but to contentment. To me that's important. It isn't to you, or to the woman you ought to marry. And I . . . well . . . I simply don't envy either of you a bit!"

"I see," said Bordman with irony. He didn't. "I wish you all the contentment you look for." Then he snapped: "But what's this business about expecting more from me? What spectacular idea do you expect me to pull out of somebody's hat now? Because I'm frantically vain!"

"I haven't the least idea," said Aletha calmly. "But I think you'll come up with something we couldn't possibly imagine. And I didn't say it was because you were vain, but because you are discontented with yourself. It's born in you! And there you are!"

"If you mean neurotic," snapped Bordman, "you're all wrong. I'm not neurotic! I'm not. I'm annoyed. I'll get hopelessly behind schedule because of this mess! But that's all!"

Aletha stood up and shrugged her shoulders ruefully.

"I repeat my apology," she told him, "and leave you the office. But I also repeat that I think you'll turn up something nobody else expects—

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and I've no idea what it will be. But you'll do it now—to prove that I'm wrong about how your mind works."

She went out. Bordman clamped his jaws tightly. He felt that especially haunting discomfort which comes of suspecting that one has been told something about himself which may be true.

"Idiotic!" he fumed, all alone. "Me neurotic? Me wanting to prove I'm the best man here out of vanity?" He made a scornful noise. He sat impatiently at the desk. "Absurd!" he muttered wrathfully. "Why should I need to prove to myself I'm capable? What would I do if I felt such a need, anyhow?"

Scowling, he stared at the wall. It was irritating. It was a nagging sort of question. What would he do if she were right? If he did need constantly to prove to himself—

He stiffened, suddenly. A look of intense surprise came upon his face. He'd thought of what a self-doubtful, discontented man would try to do, here on Xosa II at this juncture.

The surprise was because he had also thought of how it could be done.

The *Warlock* came to life. Her skipper gloomily answered the emergency call from Xosa II. He listened. He clicked off the communicator and hastened to an exterior port, deeply darkened against those times when the blue-white sun of Xosa shone upon this side of the hull. He moved the manual control to make it more transparent. He stared down at the monstrous, tawny, mottled surface of the planet five thousand miles away. He searched for the spot he bitterly knew was the colony's site.

He saw what he'd been told he'd see. It was an infinitely fine, threadlike projection from the surface of the planet. It rose at a slight angle —it leaned toward the planet's west —and it expanded and widened and formed an extraordinary sort of mushroom-shaped object that was completely impossible. It could not be. Humans do not create visible objects twenty miles high, which at their tops expand like toadstools on excessively slender stalks, and which drift westward and fray and grow thin, and are constantly renewed.

But it was true. The skipper of the *Warlock* gazed until he was completely sure. It was no atomic bomb, because it continued to exist. It faded, but was constantly replenished. There was no such thing!

He went through the ship, bellowing, and faced mutinous snarlings. But when the *Warlock* was around on that side of the planet again, the members of the crew saw the strange appearance, too. They examined it with telescopes. They grew hysterically happy. They went frantically to work to clear away the signs of a month and a half of mutiny and despair.

It took them three days to get the ship to tidiness again, and during all that time the peculiar tawny jet remained. On the sixth day the jet was fainter. On the seventh it was

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larger than before. It continued larger. And telescopes at highest magnification verified what the emergency communication had said.

Then the crew began to experience frantic impatience. It was worse, waiting those last three or four days, than even all the hopeless time before. But there was no reason to hate anybody, now. The skipper was very much relieved.

There was eighteen hundred feet of steel grid overhead. It made a crisscross, ring-shaped wall more than a quarter-mile high and almost to the top of the surrounding mountains. But the valley was not exactly a normal one. It was a crater, now: a steeply sloping, conical pit whose walls descended smoothly to the outer girders of the red-painted, glistening steel structure. More girders for the completion of the grid projected from the sand just outside its half-mile circle. And in the landing grid there was now a smaller, elaborate, truss-braced object. It rested on the rocky ground, and it was not painted, and it was quite small. A hundred feet high, perhaps, and no more than three hundred across. But it was visibly a miniature of the great, now-uncovered, re-painted landing grid which was qualified to handle interstellar cargo ships and all the proper space-traffic of a minerals-colony planet.

A caterwheel truck came lurching and rolling and rumbling down the side of the pit. It had a sunshade and ground-reflector wings, and Bordman rode tiredly on a hobby-horse saddle in its back cargo section. He wore a heat-suit.

The truck reached the pit's bottom. There was a tool shed there. The caterwheel-truck bumped up to it and stopped. Bordman got out, visibly cramped by the jolting, rocking, exhausting-to-unaccustomed-muscles ride.

"Do you want to go in the shed and cool off?" asked Chuka brightly.

"I'm all right," said Bordman curtly. "I'm quite comfortable, so long as you feed me that expanded air." It was plain that he resented needing even a special air supply. "What's all this about? Bringing the *Warlock* in? Why the insistence on my being here?"

"Ralph has a problem," said Chuka blandly. "He's up there. See? He needs you. There's a hoist. You've got to check degree-of-completion anyhow. You might take a look around while you're up there. But he's anxious for you to see something. There where you see the little knot of people. The platform."

Bordman grimaced. When one was well started on a survey, one got used to heights and depths and all sorts of environments. But he hadn't been up on steel-work in a good many months. Not since a survey on Kalka IV nearly a year ago. He would be dizzy at first.

He accompanied Chuka to the spot where a steel cable dangled from an almost invisibly thin beam high above. There was a strictly im-

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provised cage to ascend in—planks and a handrail forming an insecure platform that might hold four people. He got into it, and Dr. Chuka got in beside him. Chuka waved his hand. The cage started up.

Bordman winced as the ground dropped away below. It was ghastly to be dangling in emptiness like this. He wanted to close his eyes. The cage went up and up and up. It took many long minutes to reach the top.

There was a platform there. Newly-made. The sunlight was blindingly bright. The landscape was an intolerable glare. Bordman adjusted his goggles to maximum darkness and stepped gingerly from the swaying cage to the hardly more solid-seeming area. Here he was in mid-air on a platform barely ten feet square. It was rather more than twice the height of a metropolitan skyscraper from the ground. There were actual mountain-crests only half a mile away and not much higher. Bordman was acutely uncomfortable. He would get used to it, but—

"Well?" he asked fretfully. "Chuka said you needed me here. What's the matter?"

Ralph Redfeather nodded very formally. Aletha was here, too, and two of Chuka's foremen—one did not look happy—and four of the Amerind steel-workers. They grinned at Bordman.

"I wanted you to see," said Aletha's cousin, "before we threw on the current. It doesn't look like that little grid could handle the sand it took care of. But Lewanika wants to report."

A dark man who worked under Chuka—and looked as if he belonged on solid ground—said carefully:

"We cast the beams for the small landing grid, Mr. Bordman. We melted the metal out of the cliffs and ran it into molds as it flowed down."

He stopped. One of the Indians said:

"We made the girders into the small landing grid. It bothered us because we built it on the sand that had buried the big grid. We didn't understand why you ordered it there. But we built it."

The second dark man said with a trace of swagger:

"We made the coils, Mr. Bordman. We made the small grid so it would work the same as the big one when it was finished. And then we made the big grid work, finished or not!"

Bordman said impatiently:

"All right. Very good. But what is this? A ceremony?"

"Just so," said Aletha, smiling. "Be patient, Mr. Bordman!"

Her cousin said conversationally:

"We built the small grid on the top of the sand. And it tapped the ionosphere for power. No lack of power then! And we'd set it to heave up sand instead of ships. Not to heave it out into space, but to give it up to mile a second vertical velocity. Then we turned it on."

"And we rode it down, that little

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grid," said one of the remaining Indians, grinning. "What a party! Manitou!"

Redfeather frowned at him and took up the narrative.

"It hurled the sand up from its center. As you said it would, the sand-swept air with it. It made a whirlwind, bringing more sand from outside the grid into its field. It was a whirlwind with fifteen megakilowatts of power to drive it. Some of the sand went twenty miles high. Then it made a mushroom-head and the winds up yonder blew it to the west. It came down a long way off, Mr. Bordman. We've made a new dune-area ten miles downwind. And the little grid sank as the sand went away from around it. We had to stop it three times, because it leaned. We had to dig under parts of it to get it straight up again. But it went down into the valley."

Bordman turned up the power to his heat-suit motors. He felt uncomfortably warm.

"In six days," said Ralph, almost ceremonially, "it had uncovered half the original grid we'd built. Then we were able to modify that to heave sand and to let it tap the ionosphere. We were able to use a good many times the power the little grid could apply to sand-lifting! In two days more the landing grid was clear. The valley bottom was clean. We shifted some hundreds of millions of tons of sand by landing grid, and now it is possible to land the *Warlock,* and receive her supplies, and the solar-power furnace is already turning out pigs for her loading. We wanted you to see what we have done. The colony is no longer in danger, and we shall have the grid completely finished for your inspection before the ship is ready to return."

Bordman said uncomfortably:

"That's very good. It's excellent. I'll put it in my survey report."

"But," said Ralph, more ceremonially still, "we have the right to count coup for the members of our tribe and clan. Now—"

Then there was confusion. Aletha's cousin was saying syllables that did not mean anything at all. The other Indians joined in at intervals, speaking gibberish. Aletha's eyes were shining and she looked incredibly pleased and satisfied.

"But what . . . what's this?" demanded Bordman when they stopped.

Aletha spoke proudly.

"Ralph just formally adopted you into the tribe, Mr. Bordman—and into his clan and mine! He gave you a name I'll have to write down for you, but it means, 'Man-who-believes - not - his - own - wisdom' And now—"

Ralph Redfeather—licensed interstellar engineer, graduate of the stiffest technical university in this quarter of the galaxy, wearer of three eagle-pinion feathers and clad in a pair of insulated sandals and a breechcloth—whipped out a small paint-pot and a brush from somewhere and began carefully to paint on a section of girder ready for the

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next tier of steel. He painted a feather on the metal.

"It's a coup," he told Bordman over his shoulder. "Your coup. Placed where it was earned—up here. Aletha is authorized to certify it. And the head of the clan will add an eagle-feather to the headdress he wears in council in the Big Tepee on Algonka, and—your clan-brothers will be proud!"

Then he straightened up and held out his hand.

Chuka said benignly:

"Being civilized men, Mr. Bordman, we Africans do not go in for uncivilized feathers. But we . . . ah . . . rather approve of you, too. And we plan a corroboree at the colony after the *Warlock* is down, when there will be some excellently practiced singing. There is . . . ah . . . a song, a sort of choral calypso, about this . . . ah . . . adventure you have brought to so satisfying a conclusion. It is quite a good calypso. It's likely to be popular on a good many planets."

Bordman swallowed. He was acutely uncomfortable. He felt that he ought to say something, and he did not know what.

But just then there was a deep-toned humming in the air. It was a vibrant tone, instinct with limitless power. It was the eighteen-hundred-foot landing grid, giving off that profoundly bass and vibrant note it uttered while operating. Bordman looked up.

The *Warlock* was coming down.

THE END

IN TIMES TO COME

Algis Budrys has a yarn coming up next time—"The Executioner." It's about an honest, deeply sincere, genuinely incorruptible and fearless man—who is the most dangerous of all possible types, for he is also a fool. It's normally held that a ruthless man is cruel, sadistic, selfish—all sorts of undesirable things. But such people aren't very dangerous, really; they normally get stopped fairly quickly. The man Budrys tells of is of a different, and deadlier type . . .

There will, also, be an article by Murray Leinster, "Labor of Love." It might be titled "On the Right to Be a Crackpot." I think you'll find it fun!

THE EDITOR.

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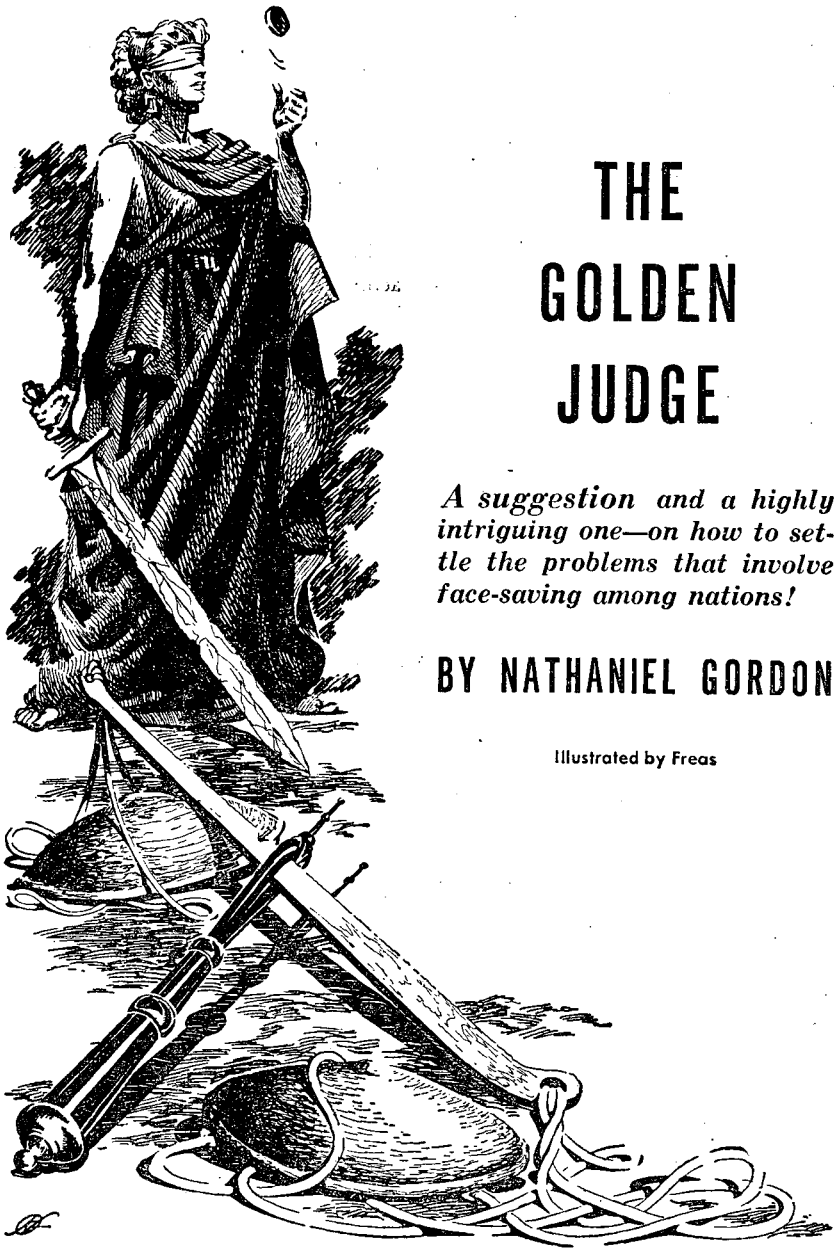

THE GOLDEN JUDGE

A suggestion and a highly intriguing one—on how to settle the problems that involve face-saving among nations!

BY NATHANIEL GORDON

Illustrated by Freas

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UNITED NATIONS, N. Y., June 16, 1981—(AP)—In one of the most impressive ceremonies ever held in the United Nations building, the world celebrated today the 25th anniversary of the discovery of the "Golden Judge."

General Terence P. O'Reilly, USA (Retired), the man responsible for the discovery, was the principal guest of honor. Obviously moved by the acclaim from virtually every member nation, Gen. O'Reilly made a brief speech recapturing for a moment the accidental circumstances of 25 years ago that so drastically reduced world tensions . . .

It was stifling hot in Jerusalem in the afternoon of June 16, 1956, and Major General Terence Patrick O'Reilly, United States Army, was rather more bored than usual. His Army career had gone well—two stars already at forty-five—until the mysterious workings of the Pentagon had given him perhaps the most frustrating posting a soldier could have.

He was chairman of the mixed United Nations armistice commission trying to keep the uneasy peace between Israel and her Arab neighbors. For months he had presided over unending investigations of border incidents, some petty, some not so petty. He had signed reports reprimanding and recommending and approving, but nothing ever came of them, and he no longer expected anything ever would.

Today's hearing was different, and not strictly in his field. But because he was an engineer, and because both Arabs and Israelis trusted him, he had agreed to listen to their opposing arguments on using the waters of the River Jordan.

Too many years ago, the United States had offered to provide most of the funds for a "little TVA" on the river, benefitting both Israel and Jordan alike. At first, both had refused outright to have anything to do with the other. But over the years, skillful negotiating by Eric Johnston, the American President's personal envoy, had brought Israel and Jordan closer and closer together—until now they agreed on the disposal of ninety per cent of the water.

But farther than this they would not go. For months, years, they balked on the remaining ten per cent, and the dams remained only blueprints.

Terence O'Reilly was sick unto death of the arguments, and thought everyone else was, too. He had heard them over and over; he knew them by heart. He knew they were evenly balanced, with justice on both sides. He knew both nations longed for a settlement, but he knew neither would back down, for reasons of "face." Worst of all, he knew that any decision of his was meaningless. It was purely advisory, and he knew all too well what "advisory" opinions counted for out here.

Yet he tried to look interested as the delegate from Jordan wearily produced an argument that every

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man in the conference room could recite word for word.

In a brief lull, General O'Reilly groaned: "Why don't they toss a coin for it?"

It was not as *sotto voce* as he meant.

The Arab delegate stared at him. "I beg your pardon!"

Flushing, General O'Reilly apologized, but the Arab was already talking excitedly to his fellow delegates. Puzzled, O'Reilly heard a confused babble of Arabic, then sudden silence.

The Arab delegate had a glint in his eye as he asked for the floor.

"In the name of my country," he said proudly, "we agree!"

The word "agree" had not been heard in this chamber for many months, and General O'Reilly wondered if he had heard aright. "Agree?" he stared. "Agree to what?"

"To toss a coin for it, as the chairman has proposed," the Arab said. "That is, if the Israeli delegation has the courage, the sportsmanship to agree." He looked tauntingly to his rivals across the room.

The Israeli leader sprang to his feet, indignant. "I protest, Mr. Chairman, to this frivolous treatment of a serious matter, which will affect the future of—"

He felt silent, aware of the contemptuous smiles on the faces of the Arabs.

General O'Reilly kept his countenance. He said mildly: "Of course, if you are not willing to risk the luck of—"

"We are afraid of nothing, sir!" the Israeli snapped. "We are as sporting as anyone else, but—" One of his fellow delegates whispered something to him. Then the whole Israeli delegation talked in low voices. Finally the leader rose again. "Will you permit me to telephone my minister?"

Gravely the general recessed the meeting for thirty minutes. In his own room, he stared at himself in the mirror, still dazed.

"My God!" he breathed. "They can't be taking it seriously!"

But why not? If the arguments were so evenly balanced that not even Solomon could have chosen, if they really wanted a settlement, if they could never give in without losing "face"—why, what better method than to trust it to the fall of a coin? Still—things just didn't happen that way.

When the thirty minute recess ended, the Israeli delegate arose. He glared across the room and announced defiantly: "My government also agrees! Let the coin decide!"

The conference broke into clamor, but General O'Reilly had long since learned the value of prudence in Jerusalem. "The chairman agrees," he said judicially, "that in the circumstances, this is perhaps an excellent solution, perhaps the only solution. But this has been, to say the least, somewhat impulsive. Let me suggest both sides return to their governments and consider this well.

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Then, if you are both still willing, let us meet here one week from today, in this room—and the coin will decide!"

He had expected second thoughts, and he was not disappointed. Extremists on both sides of the Jordan screamed with indignation. Yet, oddly, most people seemed strangely excited, even pleased by the sporting proposition. They began to lay bets on the outcome.

And both governments held firm. Probably, the general speculated, because they both wanted a solution—and there was no other solution in sight. Also, each hated to be the first to back down from a fair bet. It became a matter of honor.

On the week end, General O'Reilly flew to Cairo to meet some friends passing through on a world tour. Like all tourists, they went to the Mouski, Cairo's great bazaar, and it was there, in the Street of the Goldsmiths, that the general got his idea.

It cost him a chunk of money, out of his own pocket, but like most Irishmen, he was a sporting man himself. After all, he grinned to himself, I started the whole business, and I might as well do it up in style.

He had decided that no ordinary coin would do for such an historic occasion. So he had a goldsmith make him a heavy solid-gold medallion almost twice as big as a twenty-dollar gold piece. He was not very much pleased with the design he sketched out hastily, but on the spur of the moment, he could think of nothing better.

The "Heads" side of the great coin bore a *front* view of the blind goddess of justice, with her scales. The "Tails" side had a *rear* view of the same lady.

It was rather crudely done, but time was short. "It'll have to do," the general chuckled, as the plane bore him back to Jerusalem.

When the appointed day came, the United Nations conference room in Jerusalem was jammed with Israeli and Arab officials, and with a pack of correspondents who had magically appeared.

General O'Reilly had decided against asking each side to put its agreement into writing. A true gentleman's agreement shouldn't be written, he concluded. He merely asked the leaders for each side if they agreed to abide by the fall of the coin. Solemnly, both assented.

Courteously, the Israelis had allowed the Arabs to call while the coin was still in the air. There was silence as General O'Reilly flipped it high up towards the ceiling.

"Tails!" cried the Arab leader.

The spinning coin glittered, falling onto the green baize table. The general looked at it. The goddess had her back turned.

"It is tails," he announced, and the Arab delegation broke into happy shouts.

And, astonishingly, that was that. The leading Tel-Aviv newspaper summed up Israeli feeling when it

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wrote in an editorial: "Certainly there were many heavy hearts in our country when the coin fell against us. But let us show the world that we are true sportsmen. We risked, and we lost. Let this be the end of it."

Work began on the dams at last, without interference or protest. Not a word was ever written on paper, but it was the only agreement between the two countries that was scrupulously kept by both sides.

It was, of course, a wonderful story. The name of Terence O'Reilly swam suddenly into the headlines, and his wife began keeping a scrapbook of all the clippings. One among them was destined to be more potent in world affairs than all the rest. It was a "profile" of General O'Reilly published in a great American magazine, and it was notable for two things.

To begin with, it was the author of this profile who first gave the coin the name by which it soon became so famous—the "Golden Judge."

But it also contained a casual, seemingly insignificant remark by General O'Reilly. When the interviewer had asked how he happened to think of the coin-tossing idea, the general had grinned. "Why not?" he said. "Aren't the Irish the gamblingest people on earth?"

And it was this innocent sentence, hardly noticed at the time, that started the "Golden Judge" on its fantastic career, and kept it from being a mere nine-day wonder.

For a Chinese Communist diplomat in Berne, Switzerland, happened to see it and, one night at a dinner party, he said mockingly: "This stupid American general in Jerusalem is obviously ignorant of the world. Otherwise, he would realize that no nation on earth loves gambling so much as the Chinese. Anyone who knows the Orient will tell you this."

This made good cocktail party talk, a thing desperately needed in Berne, and eventually reached the ears of an Associated Press correspondent. He filed a paragraph on it for a box story and, in the inevitable way of the press, a reporter in Jerusalem asked General O'Reilly for his comment.

"Well," he said, "I've heard the Chinese are great gamblers indeed, although whether more so than the Irish I beg leave to doubt."

Then his eyes twinkled. "Why don't they prove it? Why don't they toss a coin, say, for Quemoy and Matsu? The danged little places aren't worth a nickel to either side, and well they both know it. But they'll neither of them back down a hair, for losing face. I say, if they think they're the greatest gamblers on earth, let 'em prove it!"

This sped into print, caused a world-wide stir, and brought General O'Reilly a sizzling reprimand from the Department of the Army. He was not REPEAT NOT to express opinions about the value of allied territory.

He read the reprimand ruefully,

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reminded himself that another great Irish failing was too much talk—and said good-by to any hopes for a third star.

But this was before the black headlines from Formosa. With popping eyes, General O'Reilly read that the Chinese Nationalist Foreign Minister had taken up the challenge. He offered to toss a coin with the Chinese Communists for Quemoy and Metsu!

"I'll be jiggered!" the general breathed. "They'll fight about everything else, but be damned if they'll admit the Irish are bigger gamblers than the Chinese! Now let's see what the Commies say."

Peking was silent for two weeks. Then, in a broadcast from Radio Peking, Chou En-Lai made his reply.

He agreed—but with conditions. He insisted on a neutral commission to supervise the toss, half Communist members, half non-Communist. World observers, weary of neutral commissions that never achieved anything, interpreted this as a delaying tactic and agreed the whole thing would fall through.

"This is further proof," the Nationalist Foreign Minister commented with icy scorn, "that the Communists are no longer real Chinese. For any Chinese worthy of the name would not be afraid to risk the fall of the coin."

But Marx had not quite liquidated the gambling fever that runs strong in the blood of any Chinese, be he ever so Communist.

Stung, Chou En-Lai retorted: "We agree! Let the coin decide!"

It was agreed that Prime Minister Nehru of India, as a neutral, should supervise the matter, and that New Delhi would be the scene of the actual tossing. And Nehru thought it fitting to invite General O'Reilly, as the father of the whole thing, to bring the same "Golden Judge" to India, to be used again.

The general came gladly, but declined to make the toss himself. "My country is too closely involved in this matter," he explained, "and there might be talk if an American made the toss."

He suggested Nehru himself do it, and the Prime Minister agreed.

The actual tossing was done in the great governmental palace, and Communist China won. Chiang Kai Shek's delegate bowed impassively and said coolly that his government yielded without question to the goddess of chance.

That night the Indian Prime Minister was host to a glittering official banquet to celebrate the ending of the "offshore island" crisis.

"And we must lift our glasses," he said eloquently after dinner, "to the man who discovered this eminently sane method of settling quarrels—a method so sensible, so fair that it is difficult to believe that in all the world's long search for peace, it has not been discovered before. I give you General O'Reilly!"

The general rose to loud applause. He expressed his thanks modestly, and disclaimed any merit except that

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of pure luck. Then he held up the "Golden Judge" itself, with a gleam in his eye.

"I hope," he said, "that this coin will have still more work to do. Surely there are still disputed places in the world, where justice lies on both sides, where only 'face-saving' prevents a settlement. And surely it is better to resort to this coin than to force and war and bitter arguments that drag on year after year."

"Hear! Hear!" Nehru cried, leading the applause. General O'Reilly stood smiling until it died away.

"Places like Kashmir," he said clearly.

There was a gasp of laughter, quickly hushed. Nehru's face was pale with anger; he was famous for his temper. And everyone knew how India and Pakistan had quarreled for years over Kashmir, and that all the efforts of the United Nations had come to nothing so far.

"I was delighted to hear Prime Minister Nehru say," General O'Reilly went on calmly, "how much he approved this method of settling old disputes. And I should be very glad to help—with this." Smiling, he tossed the Golden Judge in the air and caught it again.

Nehru could keep silent no longer. Like a skilled Oriental debater, he struck back indirectly. "We thank General O'Reilly," he said acidly, "for his kind offer, but perhaps it should be first used by his own people, the Irish, of whose gambling prowess he is so proud. Surely no bitterness has lasted longer than that between the Republic of Ireland and the 'Six Lost Counties' of Northern Ireland. Let the Irish use the Golden Judge themselves before they counsel it for others!"

But General O'Reilly was unruffled. "I'm an American, myself," he said, smiling, "although proud indeed of my Irish blood. And the *Irish* Irish will have to speak for themselves, although I venture to say you'll find them a sporting people indeed. But that's not quite the point, is it? 'Twas you yourself, sir, who praised the Golden Judge so highly. And you've seen today what fine sportsmen the Chinese are. The point is, are the *Indians* a sporting people?"

"Of course we're a sporting people!" Nehru glared.

"Then I take it you'd be willing, assuming Pakistan agrees, of course, but I'm told they're a *very* sporting people, to—" The general tossed the coin again, absent-mindedly.

"All right!" Nehru grated. "If they agree, so do we!"

It took a month before Pakistan could agree, and all the arrangements be made for the Toss on Kashmir. But in that month, the world had other things to think about. Chiang Kai Shek accepted his gambling loss without a murmur and removed his troops from Quemoy and Matsu, the American Seventh Fleet helping, the Communists not interfering. All civilians on the islands who wished to go to Formosa were taken there.

Washington said little officially,

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but in the corridors of the Pentagon, Congress and the White House, the sighs of relief reached gale force. General O'Reilly received a confidential and personal message from the Army Chief of Staff that made him pink with pleasure.

"May get that third star after all," he told his wife that night. "And not too long to wait, maybe."

But, above all, the month was filled with clamor from Ireland. Her Majesty's Government in Whitehall had immediately issued a communiqué which took a glacial view of the "puerile" proposal to toss for Northern Ireland. It was the timing of this communiqué, rather than its contents, that proved a tactical error. It had come too quickly, and Irishmen, both north and south, resented it.

As a Belfast newspaper wrote tartly: "Irishmen on both sides of the line are quite able to decide such matters for themselves, without the motherly interference of London."

Dublin agreed in principle to toss, but the wrangling over conditions and exceptions boiled up into the greatest inter-Irish quarreling of twenty years. It was still raging when General O'Reilly flew into the Vale of Kashmir with a broad smile and the Golden Judge.

Again the great coin glittered high in the air while none other than Nehru himself called out, tensely: "Heads!"

It fell "Tails."

"So be it!" Nehru said calmly, shaking hands with the Governor-General of Pakistan.

"Well, general," Nehru said, turning to O'Reilly with a smile, "are you satisfied now? I think we've proved we're a sporting people. So have the Chinese, and the Jews and the Arabs. But what about your own folk, the Irish? From what I read, their sporting qualities seem to be highly overrated. I'd say they'd never gamble but on a sure thing."

The general's face went red at the insult, and so, a day later, did the collective face of all Irishmen, North and South. For a while there was aghast silence from the Emerald Isle, a silence sullen and embarrassed. And then a great rumbling roar of indignation.

"Mr. Speaker!" cried a member of the Dail in Dublin. "Are the Irish people, who honor great gamblers only a little less than great poets, to be outdone by dark-skinned heathen? Mr. Speaker, I say *no*!"

The following morning, the government of Eire formally offered to toss for the Six Lost Counties and, if the coin fell contrary, to say no more about them forever. Belfast agreed that same afternoon, and the whole island went wild with excitement. Hardly any Irishman failed to place some kind of side bet on the outcome, and stakes were laid that day that would be spoken of with prideful awe for generations to come.

The remark of a Limerick drayman was widely quoted. "There's not a man of us here," he comment-

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ed in the course of a game of darts at the Sword and Shamrock, "but would toss a coin for his grandmother's head, and well ye know it. So after all the blatherin' and yowrin', why not have a go for the Six Counties, and let the coin decide it now and foriver, once and for all, win or lose?"

The British Government surrendered with grace, and offered to play host to the toss in London, as a neutral place. They soon learned, with burning ears, that the last place on earth any Irishman considered neutral was London.

As a matter of course, General O'Reilly was invited to preside, using the Golden Judge. Like most Irishmen in America, he had long sung of and sighed for the Auld Sod, while carefully avoiding going there, even for a visit.

He now realized his error. He was received as one of Ireland's most glorious sons. He was set upon by thousands, perhaps hundreds of thousands, of proud O'Reillys—there were O'Reillys from the bogs and O'Reillys from the great houses, O'Reillys in tophats and O'Reillys in tam o' shanter. He was assured, and came near believing it, that in both looks and wisdom, he was the spitting image of the Great O'Reilly, one of the many last rightful Kings of Ireland. A minstrel composed a lay about him, "The Golden Judge of Ireland"; he was smothered in shamrock, and could have swum in the gifts of potheen. Secretly he much preferred Scotch whisky to Irish, but the swarming O'Reillys made the disposal of the potheen no very great problem.

The actual toss took place in a small railroad station, hastily cleaned up, on the railway line between Dublin and Belfast. Impartial surveyors had certified it as being exactly astraddle the frontier.

Amid a deathlike hush, with a high sense of history in his heart, General O'Reilly flipped the Golden Judge high in the air.

Eire won. The Six Counties were no longer lost, and there was little enough work done in Ireland for a fortnight. Eire instantly and magnanimously granted to her new north all the points that had been fought over so bitterly for so many years. For the northerners, to their surprise, life went on exactly as before, except for different postage stamps, and a changed heading on their income-tax returns, which were considerably lower. For the first time in many years, there were no brickbats thrown if a man felt the need, on a summer night, to sing "God Save the Queen."

General O'Reilly flew away from Ireland with a mist in his eyes and a great glow in his heart. In a shaven second, he had achieved the thing for which long and gallant generations of earlier O'Reillys had fought bloodily and in vain. For a fleeting moment, he wondered if his nervous right hand that day had shown any subconscious partisanship, but rejected the thing as impossible.

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If the toss for the Six Counties was, in a way, the crowning peak of General O'Reilly's career, it was by no means the end of it. Both he and his coin were fast becoming settled tradition. He continued his normal military career, but with the tacit understanding he would have a few days' leave of absence whenever the Golden Judge was needed.

He took it to Stockholm for the toss that settled the old and bitter fishing controversy between Britain and Iceland. Britain won.

He took it to Cairo, where Britain and Greece tossed for Cyprus. Greece won, and at once offered Britain all the bases she wanted there, and granted special extraterritorial status to all British colonels, knights' widows and former governors of the Punjab living in retirement on the island.

He got his third star just before he flew down to Rio de Janiero for the toss that finally settled the nagging quarrel between Britain and Argentina as to who owned the Falkland Islands. Britain won.

He took it to The Hague in Holland for the toss about the Saar. The Saar had remained a European sore point despite a series of Franco-German "settlements" which never seemed to settle anything. Germany won the toss, and immediately, of her own free will, granted the French equal commercial rights.

The Saar toss had two odd results. The first was purely personal for General O'Reilly, but he never forgot it. One day, driving through The Hague, his official car passed a huge dignified building, which his chauffeur explained was the World Court. With a strange feeling, the general noticed a solemn old man in black, staring bleakly out the window. He realized suddenly it was probably a judge, and that the golden coin in his pocket had turned this costly mechanism into an anachronism. Nobody used the World Court any more now.

The other result of the Saar toss was, from the viewpoint of world jurisprudence, far more important. It transformed the Golden Judge from a mere tradition into an established legal institution, in this manner:

France and Germany had been unable to agree whether the Saar was really *tossable*—a term that soon entered dictionaries—and had appealed to the United Nations to decide. A temporary or *ad hoc* United Nations commission had been named to settle this point and, after due deliberation, had pronounced the Saar tossable.

Technically, this "Saar Commission" should have then dissolved itself. Instead, in the way of parliamentary institutions, it lingered on and soon became the accepted body to decide on tossability. And, illogically, it was forever afterwards still called the "Saar Commission."

Whenever, anywhere in the world, some international dispute reached stalemate, it became commonplace for some delegate to rise and say: "Mr. Chairman, I move the ques-

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tion be referred to the Saar Commission."

In due course, the Saar Commission would then give its solemn judgment as to whether or not the dispute should be put to the arbitrament of the Golden Judge. If so, General O'Reilly would board a plane, and be off.

Once the Saar Commission had its say, no nation ever dared refuse to put a dispute to the hazard of the coin. Whereas nations yawned at being called "warmongers" or "imperialists" or "aggressors" or "international bandits," none could stand being called "bad sportsmen" or "poor losers." So many nations had accepted the verdict of the Golden Judge, that it became increasingly more difficult, not to say impossible, for a given nation to admit it was less sporting than the others.

However, not all disputes were held tossable, to the disappointment of some people who had too quickly believed the Golden Judge would bring immediate Utopia, the end of all quarreling forever. Gradually the Saar Commission evolved certain criteria:

1. A dispute was not tossable if it might give great populations and great nations over into systems of government they abhorred; it was tossable only if the population involved had no very great bias one way or the other.

2. A tossable dispute was one in which justice lay on both sides, evenly balanced.

3. Tossing was clearly indicated where both sides ardently wished a settlement, but where neither side was willing to cede an inch, for fear of losing "face."

Thus the Saar Commission pronounced untossable the proposal by the Soviet Union to have the Golden Judge decide whether or not America should abandon all her overseas bases. It also turned down the suggestion of an American senator that Russia and the United States should toss for Soviet withdrawal from all Eastern Europe. It denied the appeal of an idealistic Dane who wanted a toss to decide whether Germany should be all Communist or all-Western. It likewise rejected a Swiss proposal that Chiang Kai Shek and Chou En-Lai should toss again, this time for Formosa itself.

In passing, it is of interest to note that only once did Soviet Russia agree to toss. It was in the matter of her old dispute with Persia over caviar fishing rights in the Caspian Sea. Persia won but, to the consternation of the world, Russia refused to abide by the outcome. It was the first and only time that the decision of the Golden Judge was not obeyed, and it had startling repercussions.

All over the world, fellow-travelers abandoned the Soviet cause. They had been able to find some excuses, however tortuous, for Russian purges, forced confessions, concentration camps and aggressions, but they turned away, shocked and saddened, from a nation that openly welshed on a bet.

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There were strong reactions within Russia itself, although the convulsions were largely screened from Western eyes. However, an unprecedented number of Russians fled across the Iron Curtain, seeking asylum in the West. They said gloomily they could no longer support a regime that reneged on its fair gambling losses, and protested fiercely this was not the true soul of Russia.

In a gallant effort to recoup face for Russian sportsmanship, many of these refugees grimly began playing almost non-stop games of "Russian roulette," which gives the player a five-to-one chance of living. Some etxreme chauvinists proudly reduced the odds to three-to-one by inserting two bullets, and a former Red Army major named Tolbunin even used three. His *tour de force* was widely admired, although not repeated, and Tolbunin himself was given a magnificent funeral.

Yet, except for the Caspian caviar toss, the Golden Judge was obeyed as unquestioningly as the Voice from Sinai, and perhaps more so. And if it could be used only in what some called "minor" disputes, it was surprising to see, once these were settled, how really few "major" ones remained. It is impossible here, of course, to list more than a few of General O'Reilly's tosses, but he flew to nearly every spot on earth, a beloved world figure.

He flew to Ethiopia—and caught malaria there—to settle an old quarrel between that country and the Sudan over a one-square-mile Sudanese enclave named Gambela, well inside Ethiopia. A relic of the times when Britain controlled the Sudan, Gambela had long been a thorn in the side of the Conquering Lion of Judah. Although the Negus lost, he accepted the verdict as uncomplainingly as earlier disputants, some three thousand years before, had once accepted the awards of his putative ancestor, King Solomon.

General O'Reilly ended a tiny but poisonous quarrel of many years' standing as to whether British Honduras should become a part of the Republic of Honduras. Britain won.

In an epic tour in 1973 that left the world gasping with admiration, General O'Reilly spread lasting balm on many sores in the Middle East. The Golden Judge settled—in favor of Pakistan—her friction with Afghanistan over the long-disputed Pathan territory. Saudi Arabia won from Britain two small and completely worthless oases on the undefined border between Saudi Arabia and Trucial Oman. These oases had, over the years, produced many hot and vain notes, and desultory shooting, but the Lord of Saudi Arabia was subsequently much disappointed that they never produced oil. He was further dismayed when the Golden Judge awarded to Iraq a "neutral zone" between the two countries, on which they had never been able to agree, and this zone did, in fact, produce tremendous

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amounts of oil. However, he complained only to Allah.

Syria and Turkey resorted to the toss to decide about the Sanjak of Alexandretta (Iskanderun) which Turkey had been given by France back in the Thirties, when France ran Syria. Turkey won. Damascus sighed but smiled, and reopened diplomatic relations with Ankara that had been severed for more than twenty years.

But on a golden January day in 1975, in Malaga, Spain, General O'Reilly's aide-de-camp noticed that his chief seemed strangely preoccupied. The occasion was a toss between Sweden and Finland as to the possession of four large rocks lying in the sea at the head of the Gulf of Bothnia, just off the Finno-Swedish frontier. These rocks, just south of the Arctic circle, contained no population other than sea gulls, but had been warmly claimed by both nations for years. And since the weather in Scandinavia in January is miserable, the Finns and Swedes had sagely decided to hold the toss in Malaga, which was as far south as they could go and still be in Europe.

In public, General O'Reilly was himself — charming, dependable, cheerful. He carried out the toss as gracefully as he had all the others, and he made a winning speech at the banquet given by the Finns that night to celebrate their acquisition of the four sub-Arctic rocks.

But the A.D.C. was not deluded and later, on the flight back to Washington, he observed that General O'Reilly was unusually abstracted and pensive, lost in thought. But since a major does not ask a lieutenant general about such matters, he kept silent.

The fact was that the general had now reached sixty-five, and in the American Army, sixty-five is retirement age. As the ocean fled away under the racing plane, he was remembering a scene the week before in the office of the Army Chief of Staff.

"It's up to you, Terry," the Chief of Staff had said. "You know perfectly well that the President is willing, even eager, to keep you on past the retirement age. You're a big man in the world now. You can stay on the active list as long as you want. If necessary, he'll ask a special law, and there won't be one vote against it."

Then the general remembered his wife: "You've done enough, darling. It's time we had a real permanent home for once in our lives. That garden for me, those Aberdeen Angus for you—remember? You've traveled too much; you've never really gotten over that malaria. Darling, you need a rest. You've earned it."

The general gazed out the plane window, trying to make up his mind. Then suddenly he chuckled. The A. D. C. saw him pull a leather case out of his pocket and watched, puzzled, as a golden coin spun briefly in the air.

The general caught it on the back of his left hand, covering it with

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his right. Then he removed the right, looked at it.

He chuckled again.

When General O'Reilly retired the following week, the President asked Congress for a fourth star for him and, in a special message, listed in glowing terms the services he had rendered to America and the world. The bill passed without a murmur, and Terence Patrick O'Reilly became at last a full general.

Messages poured in from nearly every country in the world, from dozens of presidents and premiers, and the handful of remaining kings. Along with them came hundreds of gifts. They included a carved elephant tusk from Nepal, a Royal Copenhagen dinner service for twenty-four from the Kingdom of Denmark, a one-rupee note from a ten-year-old girl in Bombay and—a gesture that excited much speculation—a case of caviar from the Kremlin.

The Department of Defense announced that General O'Reilly had become the most decorated soldier ever to wear American uniform. In every toss, each of the rival sides had awarded him some kind of decoration. When he wore full-dress uniform, the ribbons solidly covered both sides of his tunic, and he was nearly strangled with various stars and orders that dangled from ribbons around his neck.

"He retired just in time," his wife told her daughter-in-law one day at tea. "There's not another square inch left for another ribbon."

General O'Reilly presented the Golden Judge to the United Nations, and the King of Saudi Arabia proved his sportsmanship by having a theft-proof case made for it of solid crystal, so that it could be on public display. It was soon as visited and cherished as the Magna Carta and the Liberty Bell. A night and day guard stood watch over it.

Yet it was far from a useless relic. Often the crystal case was empty, and this meant it was seeing service somewhere in the world, in the hands of a Swedish general who had finally been chosen by the United Nations to succeed Terence O'Reilly.

In his final press interview, General O'Reilly unburdened himself of some thoughts which—refined—have passed into international jurisprudence under the name of O'Reilly's Law.

"For thousands of years," the general said thoughtfully, "mankind has been making all kinds of commandments and laws and prohibitions and contracts and treaties—and broken them all when the mood suited them. Perhaps it's a sad thing to say, but so far nothing's ever been invented that men will really live up to more than the terms of a bet. With very, very few exceptions, a man—or a nation—will respect a bet when he won't respect any other damned thing on earth!"

THE END

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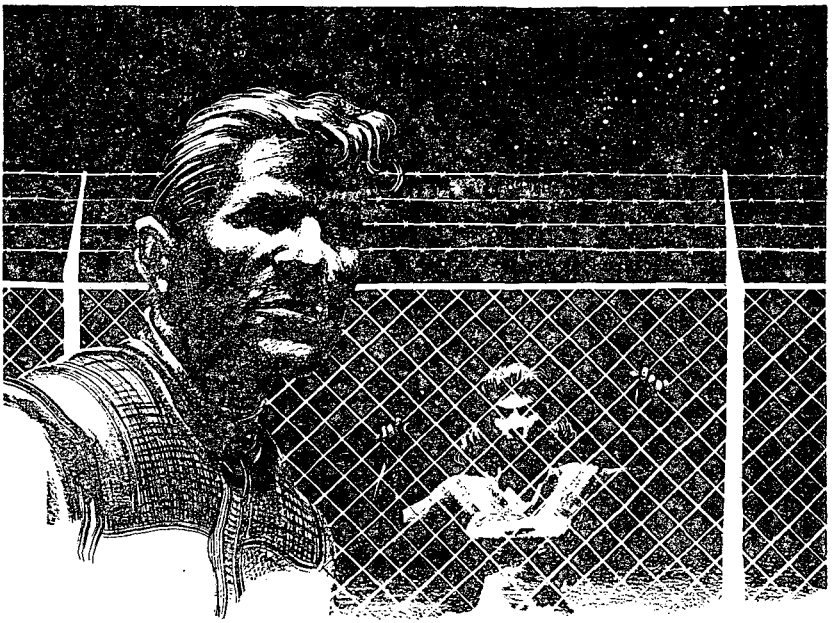

BREAKAWAY

BY STANLEY GIMBLE

Illustrated by Freas

She surely got her wish... but there was some question about getting what she wanted.

Phil Conover pulled the zipper of his flight suit up the front of his long, thin body and came into the living room. His face, usually serious and quietly handsome, had an alive, excited look. And the faint lines around his dark, deep-set eyes were accentuated when he smiled at his wife.

"All set, honey. How do I look in my monkey suit?"

His wife was sitting stiffly on the flowered couch that was still not theirs completely. In her fingers she held a cigarette burned down too far. She said, "You look fine, Phil. You look just right." She managed a smile. Then she leaned forward and crushed the cigarette in the ash tray

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on the maple coffee table and took another from the pack.

He came to her and touched his hands to her soft blond hair, raising her face until she was looking into his eyes. "You're the most beautiful girl I know. Did I ever tell you that?"

"Yes, I think so. Yes, I'm sure you did," she said, finishing the ritual; but her voice broke, and she turned her head away. Phil sat beside her and put his arm around her small shoulders. He had stopped smiling.

"Honey, look at me," he said. "It isn't going to be bad. Honestly it isn't. We know exactly how it will be. If anything could go wrong, they wouldn't be sending me; you know that. I told you that we've sent five un-manned ships up and everyone came back without a hitch."

She turned, facing him. There were tears starting in the corners of her wide, brown eyes, and she brushed them away with her hand.

"Phil, don't go. Please don't. They can send Sammy. Sammy doesn't have a wife. Can't he go? They'd understand, Phil. Please!" She was holding his arms tightly with her hands, and the color had drained from her cheeks.

"Mary, you know I can't back out now. How could I? It's been three years. You know how much I've wanted to be the first man to go. Nothing would ever be right with me again if I didn't go. Please don't make it hard." He stopped talking and held her to him and stroked the back of her head. He could feel her shoulders shaking with quiet sobs. He released her and stood up.

"I've got to get started, Mary. Will you come to the field with me?"

"Yes, I'll come to say good-by." She paused and dropped her eyes. "Phil, if you go, I won't be here when you get back—if you get back. I won't be here because I won't be the wife of a space pilot for the rest of my life. It isn't the kind of life I bargained for. No matter how much I love you, I just couldn't take that, Phil. I'm sorry. I guess I'm not the noble sort of wife."

She finished and took another cigarette from the pack on the coffee table and put it to her lips. Her hand was trembling as she touched the lighter to the end of the cigarette and drew deeply. Phil stood watching her, the excitement completely gone from his eyes.

"I wish you had told me this a long time ago, Mary," Phil said. His voice was dry and low. "I didn't know you felt this way about it."

"Yes, you did. I told you how I felt. I told you I could never be the wife of a space pilot. But I don't think I ever really believed it was possible—not until this morning when you said tonight was the take-off. It's so stupid to jeopardize everything we've got for a ridiculous dream!"

He sat down on the edge of the couch and took her hands between his. "Mary, listen to me," he said. "It isn't a dream. It's real. There's nothing means anything more to me than you do—you know that. But no

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man ever had the chance to do what I'm going to do tonight—no man ever. If I backed out now for any reason, I'd never be able to look at the sky again. I'd be through."

She looked at him without seeing him, and there was nothing at all in her eyes.

"Let's go, if you're still going," she finally said.

They drove through the streets of the small town with its small bungalows, each alike. There were no trees and very little grass. It was a new town, a government built town, and it had no personality yet. It existed only because of the huge ship standing poised in the take-off zone five miles away in the desert. Its future as a town rested with the ship, and the town seemed to feel the uncertainty of its future, seemed ready to stop existing as a town and to give itself back to the desert, if such was its destiny.

Phil turned the car off the highway onto the rutted dirt road that led across the sand to the field where the ship waited. In the distance they could see the beams of the searchlights as they played across the take-off zone and swept along the top of the high wire fence stretching out of sight to right and left. At the gate they were stopped by the guard. He read Phil's pass, shined his flashlight in their faces, and then saluted. "Good luck, colonel," he said, and shook Phil's hand.

"Thanks, sergeant. I'll be seeing you next week," Phil said, and smiled. They drove between the rows of wooden buildings that lined the field, and he parked near the low barbed fence ringing the take-off zone. He turned off the ignition, and sat quietly for a moment before lighting a cigarette. Then he looked at his wife. She was staring through the windshield at the rocket two hundred yards away. Its smooth polished surface gleamed in the spotlight glare, and it sloped up and up until the eye lost the tip against the stars.

"She's beautiful, Mary. You've never seen her before, have you?"

"No, I've never seen her before," she said. "Hadn't you better go?" Her voice was strained and she held her hands closed tightly in her lap. "Please go now, Phil," she said.

He leaned toward her and touched her cheek. Then she was in his arms, her head buried against his shoulder.

"Good-by, darling," she said.

"Wish me luck, Mary?" he asked.

"Yes, good luck, Phil," she said. He opened the car door and got out. The noise of men and machines scurrying around the ship broke the spell of the rocket waiting silently for flight.

"Mary, I—" he began, and then turned and strode toward the administration building without looking back.

Inside the building it was like a locker room before the big game. The tension stood alone, and each man had the same happy, excited look that Phil had worn earlier. When he came into the room, the noise and bustle

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stopped. They turned as one man toward him, and General Small came up to him and took his hand.

"Hello, Phil. We were beginning to think you weren't coming. You all set, son?"

"Yes, sir, I'm all set, I guess," Phil said.

"I'd like you to meet the Secretary of Defense, Phil. He's over here by the radar."

As they crossed the room, familiar faces smiled, and each man shook his hand or touched his arm. He saw Sammy, alone, by the coffee urn. Sammy waved to him, but he didn't smile. Phil wanted to talk to him, to say something; but there was nothing to be said now. Sammy's turn would come later.

"Mr. Secretary," the general said, "this is Colonel Conover. He'll be the first man in history to see the other side of the Moon. Colonel—the Secretary of Defense."

"How do you do, sir. I'm very proud to meet you," Phil said.

"On the contrary, colonel. I'm very proud to meet you. I've been looking at that ship out there and wondering. I almost wish I were a young man again. I'd like to be going. It's a thrilling thought—man's first adventure into the universe. You're lighting a new dawn of history, colonel. It's a privilege few men have ever had; and those who have had it didn't realize it at the time. Good luck, and God be with you."

"Thank you, sir. I'm aware of all you say. It frightens me a little."

The general took Phil's arm and they walked to the briefing room. There were chairs set up for the scientists and Air Force officers directly connected with the take-off. They were seated now in a semicircle in front of a huge chart of the solar system. Phil took his seat, and the last minute briefing began. It was a routine he knew by heart. He had gone over and over it a thousand times, and he only half listened now. He kept thinking of Mary outside, alone by the fence.

The voice of the briefing officer was a dull hum in his ears.

". . . And orbit at 18,000-mph. You will then accelerate for the breakaway to 24,900-mph for five minutes and then free-coast for 116 hours until—"

Phil asked a few questions about weather and solar conditions. And then the session was done. They rose and looked at each other, the same unanswered questions on each man's face. There were forced smiles and handshakes. They were ready now.

"Phil," the general said, and took him aside.

"Sir?"

"Phil, you're . . . you feel all right, don't you, son?"

"Yes, sir. I feel fine. Why?"

"Phil, I've spent nearly every day with you for three years. I know you better than I know myself in many ways. And I've studied the psychologist's reports on you carefully. Maybe it's just nervousness, Phil, but I think there's something wrong. Is there?"

"No, sir. There's nothing wrong," Phil said, but his voice didn't carry

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conviction. He reached for a cigarette.

"Phil, if there is anything—anything at all—you know what it might mean. You've got to be in the best mental and physical condition of your life tonight. You know better than any man here what that means to our success. I think there is something more than just natural apprehension wrong with you. Want to tell me?"

Outside, the take-off zone crawled with men and machines at the base of the rocket. For ten hours, the final check-outs had been in progress; and now the men were checking again, on their own time. The thing they had worked toward for six years was ready to happen, and each one felt that he was sending just a little bit of himself into the sky. Beyond the ring of lights and moving men, on the edge of the field, Mary stood. Her hands moved slowly over the top of the fence, twisting the barbs of wire. But her eyes were on the ship.

And then they were ready. A small group of excited men came out from the administration building and moved forward. The check-out crews climbed into their machines and drove back outside the take-off zone. And, alone, one man climbed the steel ladder up the side of the rocket —ninety feet into the air. At the top he waved to the men on the ground and then disappeared through a small port.

Mary waved to him. "Good-by," she said to herself, but the words stuck tight in her throat.

The small group at the base of the ship turned and walked back to the fence. And for an eternity the great ship stood alone, waiting. Then, from deep inside, a rumble came, increasing in volume to a gigantic roar that shook the earth and tore at the ears. Slowly, the first manned rocket to the Moon lifted up and up to the sky.

For a long time after the rocket had become a tiny speck of light in the heavens, she stood holding her face in her hands and crying softly to herself. And then she felt the touch of a hand on her arm. She turned.

"Phil! Oh, Phil." She held tightly to him and repeated his name over and over.

"They wouldn't let me go, Mary," he said finally. "The general would not let me go."

She looked at him. His face was drawn tight, and there were tears on his cheeks. "Thank, God," she said. "It doesn't matter, darling. The only thing that matters is you didn't go."

"You're right, Mary," he said. His voice was low—so low she could hardly hear him. "It doesn't matter. Nothing matters now." He stood with his hands at his sides, watching her. And then turned away and walked toward the car.

THE END

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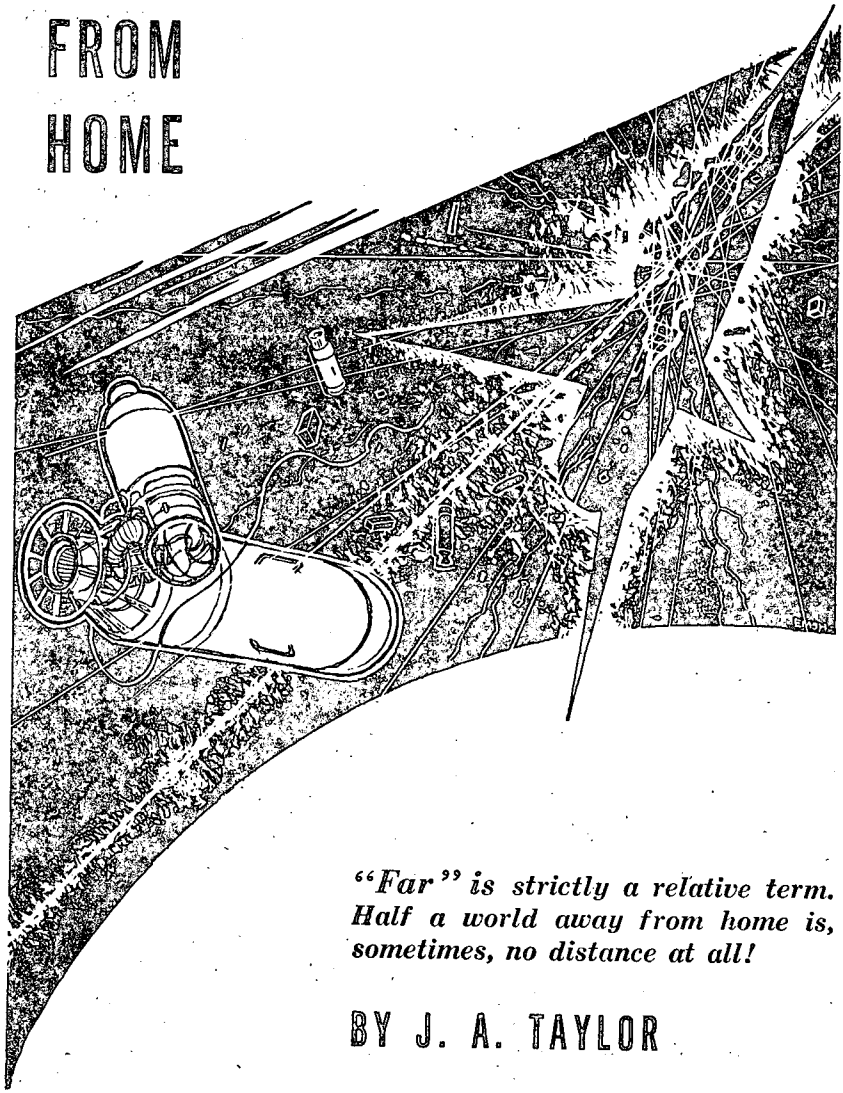
FAR FROM HOME



"Far" is strictly a relative term. Half a world away from home is, sometimes, no distance at all!

BY J. A. TAYLOR

Illustrated by Emsh

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Someone must have talked over the fence because the newshounds were clamoring on the trail within an hour after it happened.

The harassed Controller had lived in an aura of "Restricteds," "Classifieds" and "Top Secrets" for so long it had become a mental conditioning and automatically hedged over information that had been public property for years via the popular technical mags; but in time they pried from him an admittance that the Station Service Lift rocket A. J. "Able Jake" Four had indeed failed to rendezvous with Space Station One, due at 9:16 Greenwich that morning.

The initial take-off and ascent had gone to flight plan and the pilot, in the routine check-back after entering free flight had reported no motor or control faults. At this point, unfortunately, a fault in the tracking radar transmitter had resulted in it losing contact with the target. The Controller did not, however, mention the defection of the hungover operator in fouling up the signal to the standby unit, or the consequent general confusion in the tracking network with no contact at all thereafter, and fervently hoped that gentlemen of the press were not too familiar with the organization of the tracking system.

At least one of the more shrewd looking reporters appeared as though he were mentally baiting a large trap so the Controller, throwing caution to the winds, plunged headlong into a violent refutal of various erroneous reports already common in the streets.

Able Jake did not carry explosives or highly corrosive chemicals, only some Waste Disposal cylinders, dry foodstuffs and sundry Station Household supplies.

Furthermore there was no truth in the oft-revived rumors of weaknesses in the so-called "spine-and-rib" construction of the Baur and Hammond Type Three vessel under acceleration strain. The type had been discontinued solely because the rather complicated structure raised certain stowage difficulties in service with overlong turnabout times resulting.

There may have been a collision with a meteor he conceded, but, it was thought, highly unlikely. And now, the urgent business of the search called, the Controller escaped, perspiring gently.

Able Jake was sighted a few minutes later but it was another three hours before a service ship could be readied and got away without load to allow it as much operating margin as possible. Getting a man aboard was yet another matter. At this stage of space travel no maneuver of this nature had ever been accomplished outside of theory. Fuel-thrust-mass ratios were still a thing of pretty close reckoning, and the service lift ships were simply not built for it.

The ship was in an elliptical orbit and a full degree off its normal course. A large part of the control room was demolished and there was a lengthy split in the hull. There was no sign of the pilot and some

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of the cargo was missing also. The investigating crew assumed the obvious and gave it as their opinion that the pilot had been literally disintegrated by the intense heat of the collision.

The larger part of the world's population made it a point to listen in on the first space burial service in history over the absent remains of Johnny Melland.

Such a small thing to cause such a fury. A mere twenty Earth pounds of an indifferent grade of rock and a little iron, an irregular, ungraceful lump, spawned somewhere a billion years before as a star died. But it still had most of the awesome velocity and inertia of its birth.

Able Jake, with the controlling influence of the jets cut, had yawed slightly and was now traveling crabwise. The meteor on its own course, a trifle oblique to that of the ship, struck almost directly the slender spring steel spine, the frightful energy of the impact transmuted on the instant into a heat that vaporized several feet of the nose and spine before the dying shock caused an anguished flexing of the ship's backbone; thrust violently outward along the radial members and so against the ribs and hull sheathing on that side. Able Jake's hull split open like a pea pod for fully half its length and several items of its cargo burst from their lashings, erupted from the wound.

Johnny was not inboard at the time, but floating, spacesuited alongside, freeing a fouled lead to the radar bowl, swearing occasionally but without any real passion at the stupidity of the unknown maintenance man who failed to secure it properly. For some odd reason he had never quite lost the thrill of his first trip "outside," and, donning pressure suit with the speed of long practice, sneaked as many "inspections" as possible, with or without due cause.

The second's fury that reduced the third stage of a $5,000,000 rocket to junk was evident to him only as a brilliant blue-white flash, a hammer-like shock through the antennae support that left his wrist and forearm numb. Then a violent wrench as a long cylinder, expelled from the split hull, caught the loop of his life line and dragged him in till he clashed hard against it, the suddenly increased tension or a sharp edge parting the line close to the anchored end. He clawed blindly for a hold, found something he could not at that moment identify and hung on.

For a short time his vision seemed dulled and that part of his mind, trained to the quick analysis of sudden situations groped but feebly through a haze of shock to understand what had happened. Orienting himself he found he was gripping a brace of the open-mounted motor on one of the Waste Disposal Cylinders. About him he could see other odd items of the cargo, some clustering fairly closely, others just perceptibly drifting farther away. To one side, or "downwards" the Earth rolling vastly, pole over pole, and with her

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own natural rotation giving an odd illusion of slipping sideways from under him.

Only a sudden sun glint on the stubby swept-back wings showed him where Able Jake was. Far away—too far, spinning slowly end over end. His sideways expulsion from the ship then had been enough to give him and his companion debris a divergent course.

Spacemen accept without question the fact of a ship or a station always at hand with a safety man on watch at all times over those outside and a "bug" within signaling distance constantly. They do not conceive of any other state of affairs.

Now Johnny had to face the fact that he was in such a position—entirely and utterly alone, except for the useless flotsam that came with him. He might have flung himself into a mad chase after the ship on his suit jets except that the thought of leaving his little island, cold comfort though it was, to plunge into those totally empty depths was suddenly horrible.

The tide of panic rose within him. He knew the sickening bodily revolt of blind unreasoning terror—the terror of the lost, the terror of certain untimely death, but mostly of death so dreadfully alone.

He might have gone insane. In the face of the insoluble problem his mind might have retreated into a shadow world of its own, perhaps to prattle happily the last few hours away. But there was something else there. The pre-flight school psychiatrist had recognized it, Johnny himself probably wouldn't have and it wasn't their policy to tell him. It saved him. The labored heart pounding and the long shuddering gasps slowed in time and with the easing of his physical distress he found enough heart to muster a wry little smile at the thought that of the castaways of history he at least stood fair to be named the most unique.

And after a while, shaking himself mentally, a little ashamed of his temporary fall from grace, he followed the example of the more intelligent of his predecessors and settled down to itemize his assets, analyze his position and conjecture the chances of survival.

Item: He was encased in a Denby Bros. spacesuit, Mark III, open space usage, meant for no gravity use. Therefore it had no legs as such, the lower half being a rigid cylinder allowing considerable movement within and having a swivel mounted rocket motor at its base controlled by toe pedals inside.

The upper half, semiflexible with jointed arms ending in gloves from which by contorting the shoulders the hands could be withdrawn into the sleeves when not in use.

A metal and tinted plastic helmet with earphones, mike and chin switch. An oxy air-conditioning and reprocessing unit with its spare pure oxygen tank; on this he could possibly depend for twelve hours given to undue exertion and with the most rigid economy all the time.

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The power pack for suit operation and radio had a safety margin of one hour over the maximum air supply, if the radio wasn't used. At this time Johnny couldn't see much use for it.

Item: One Waste Disposal Cylinder, expendable, complete with motor and full fuel tanks, packed, according to his loading manifest with sundry supplies to avoid dead stowage space. Seldom used, since most station waste was ferried down in the otherwise empty service ships, they occasionally handled certain laboratory refuse it was considered best to destroy in space. The cylinders were decelerated and allowed to fall into atmosphere where the friction of the unchecked plunge burned up what the magnesium charge inside had not already. The rest of the shipwrecked material had by now drifted beyond easy reach and Johnny did not feel like wasting fuel rounding it up.

Position? A matter of memory and some guesswork by now. Some ten minutes out of powered flight at the time of collision, coasting up to station orbit where a quick boost from the jets would have made up his lost velocity to orbit standard. But there would be no boost now. So he'd just fall off around the other side, falling around and into Mother Earth, to skim atmosphere and climb on past and up to touch orbit altitude—and down again. A nice elliptical orbit, apogee a thousand odd miles, perigee, sixty-seventy—perhaps. How much speed had he left? How long would it be before he brushed the fringe of atmosphere once too often and too deep? Just another meteor.

And survival. A comparatively simple problem since the mechanics of it were restricted by a simple formula in which his role would seem to be a passive one. To survive he must be rescued by his own kind in twelve hours or less. To be rescued he must be seen or heard. Since his radio was a simple short-range intercom it followed that he must be seen first and heard later. Being seen meant making a sufficiently distinguishable *blip* on somebody's radar screen to arouse comment over a *blip* where, according to schedule no orbiting *blip* should be.

Johnny was painfully aware that the human body is very small in space. The cylinder would be a help but he doubted it would be enough. Then he thought of the material inside the cylinder. He pried back the lugs holding the cover in place with the screwdriver from his belt kit. He started pulling out packages, bags, boxes, thrusting them behind him, above him, downwards; cereals, ready mixed pastries, bundles of disposable paper overalls—toilet paper! He worked furiously, now stuck halfway down the cylinder, kicking the bundles behind him. He emerged finally in a flurry of articles clutching a large plastic bag that had filled the entire lower end of the tank.

About him drifted a sizable cloud of station supplies, stirring sluggishly after his emergence. He pushed them a bit more, distributing them as much

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as possible without losing them altogether.

Johnny tore open the big bag and was instantly enveloped in clinging folds of ribbon released from the pressure of its packing. He knew what it was now, the big string of ribbon chutes for the Venus Expedition, intended for dropping a remote controlled mobile observer to the as yet unseen and unknown surface. Johnny had ferried parts of the crablike mechanical monster on the last run, and illogically found himself worrying momentarily over the setback to the Probe his mischance would cause.

But in the next minute he was making fast the lower end of the string to the WD cylinder, then, finding the top chute he toed his pedals and jetted himself out, trailing the string out to its full extent.

Now the period of action was over and he had done all he could, Johnny found himself dreading the time of waiting to follow. He would have time for thinking, and thinking wasn't profitable under the circumstances unless it were something definitely constructive and applicable to his present and future well-being. Waiting was always bad.

Surely they would find him soon. Surely they would press the search farther even when they found Able Jake as they couldn't fail to in time.

A tightness started in his throat. Johnny quickly drowned the thought in a flood of inconsequential nonsense, a trick he had learned as a green pilot. He might sleep though, if sleep were a possible thing in this cold emptiness. No one, to his recollection, had ever done so outside a ship or station—the space psychology types would be interested doubtless.

Johnny tied his life line to the WD cylinder and then jetted clear of his artificial cloud, positioning himself so that it formed a partial screen between himself and the sun. He turned his oxygen down to the bare minimum and the thermostat as low as he dared. He commenced a relaxation exercise and was pleased when it worked after a fashion—a mental note for Beaufort at the station. A drowsiness crept over him, dulling a little the thin edge of fear that probed his consciousness.

Face down towards the earth he hung. The slow noise of his breathing only intensified the complete silence outside. The well padded suit encompassed him so gently there was no sense of pressure on his body to make up for the weightlessness. Johnny felt as though he were bodiless, a naked brain with eyes only hanging in nothingness.

Beneath, Earth rolled over with slow majesty, once every two hours. His altered course was evident now, passing almost directly over the geographic poles proper instead of paralleling the twilight zone where night and day met. Sometimes he caught the faint glow of a big city on the night side but the sight only stirred the worm of anxiety and he closed his eyes.

Johnny was beginning to feel very

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comfortable. He supposed sleepily that this was the way you were assumed to feel while freezing to death in a snowbank, or so he'd heard. Air and heat too low perhaps. He should really turn it up a notch.

On the other hand it was perhaps a solution to the problem of dying—a gentle sleep while the stomach was still full enough from the last meal to be reasonably comfortable and the throat yet unparched. Would it be the act of an unbalanced mind or one of the most supreme sanity?

He dozed and dreamed a bit in fragments and snatches but it was not a good sleep—there was no peace in it. At one time he seemed to be standing outside the old fretworked boarding house he lived in—looking in at the window of the "sitting room" where the ancient, wispy landlady sat among her antimacassared chairs and the ridiculous tiny seashell ashtrays that overflowed after two butts. He wanted desperately to get in and sprawl in the huge bat-winged chair by the fire and stroke the enormous old gray cat that would leap up and trample and paw his stomach before settling down to grumble to itself asthmatically for hours.

It was cold and dark out here and he wanted to get in to the friendliness and the warmth and the peaceful, familiar security, but he didn't dare go around to the door because he knew if he did the vision would vanish and he'd never find it again.

He scratched and beat at the window but his fingers made no sound, he tried to shout but his cries were only strangled whispers and the old lady sat and rocked and talked to the big gray cat and never turned her head.

The fire seemed to be flaring up suddenly, it was filling the whole room—a monstrous furnace; it shouldn't do that he knew, but the old lady didn't seem to mind sitting there rocking amid the flames—and it was so nice and warm. The fire kept growing and swelling though—soon it burst through the window and engulfed him. Too hot. Too hot.

Johnny swam hazily back to consciousness with an aching head and thick mouth. He saw that he had drifted clear of his protective screen somehow and the sun beat full on him. With clumsy, fumbling hands that seemed to belong to somebody else he managed the air valve; the increased oxygen reviving him enough to find the pedals and jet erratically about till he gained the shadow once more.

Now he was entering upon the worst phase of the living nightmare. Awake, the doubts and fears of his position tormented him; wearied, he feared to sleep, yet continually he found himself nodding only to jerk awake with that suddenness that is like a physical blow. Each one of these awakenings took away a little more of his self-control till he was reduced to near hysteria, muttering abstractly, sometimes whimpering like a lost child; now seized with a feverish concern for his air supply. He would at one instant cut it down

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to a dangerous minimum, then, remembering the near disaster of his first attempt at economy, frantically turn it up till he was in danger of an oxygen jag. In a moment he would forget and start all over again.

In addition, he was now realizing bitterly what he had subconsciously denied to himself for so long, that they had found Able Jake and drawn the obvious conclusion. That he had been obliterated or blown out through the hull by the collision without warning or preparation. That he was undoubtedly dead if not vaporized altogether and, as they must, considering the expense of a probably fruitless search, abandon him.

There came the moment when Johnny accepted this in full. This was directly after the time when, sliding down the long hill to the perigee of his orbit, he turned on his radio and cried for help. It was a bare hundred miles or less to that wonderful world below, but there was the Heaviside layer, and the weak signals beat but feebly against it. All that seeped through by some instant's freak of transmission was a fragment of incoherent babble to reach the uncomprehending ear of an Arkansas ham and give that gentleman uneasy sleep for some time to come.

He kept calling mechanically even after perigee was long past, praying for an answer from the powerful transmitters below or from a searching ship. But when there was no slightest whisper in his phones or answering flare among the stars, Johnny came to the end of faith. Even of awareness, for his own ears did not register the transition of his calls to an insane howling of intermixed pleas threats, condemnation—a sewer flood of foul vilification against those who had betrayed him.

Bright and beautiful, Earth rolled blandly beneath him, the sun was a remote impersonal thing and the stars mocked silently. After a while the radio carried only the agonized sounds of a man who had forgotten how to cry and must learn again. There were times after this when he observed incuriously a parade of mind pictures, part memory, part pure hallucination and containing nothing of reason; other times when he thought not at all. The sun appeared to dwindle, retreating and fading far away into a remote place where there were no stars at all. It became a feeble candle, guttered unsteadily a moment and suddenly winked out. Abruptly Johnny was asleep.

He opened his eyes and surveyed the scene with an oddly calm and dispassionate curiosity, not that he expected to find his status changed in any way but because he had awakened with a queer sense of unreality about the whole business. He knew vaguely that he'd had a bad time in the last few hours but could remember little of the details save that it was like one of those fragmentary nightmares in the instant between sleeping and waking when it is difficult to divide the fact from the dream. Now he must reassure himself

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that this facet of it was real and when he had done so, realized with a faint shock that he was no longer afraid.

Fear, it seemed, had by its incessant pressure dulled its own edge. The acceptance of inevitable death was still there, but now it seemed to have little more significance than the closing of a book at the last page.

It is possible that Johnny was not wholly sane at this point, but there is no one to witness this and Johnny, not given to introspection at any time, felt no spur to self-analysis, beyond a brief mental registration of the fact.

So he made his visual survey, saw that it was real, nothing had changed; noted with mild surprise that he'd somehow remained in the shadow of his screen this time. He had lost track of time entirely but the suit's air supply telltale was in the yellow indicating about two hours more or less to go on breathing. In quick succession he reviewed the events, accepted the probability of the abandoned search without a qualm and made his decision. There was no need to wait about any longer.

A quick flip of the helmet lock, a moment's unpleasantness perhaps, and out. As for the rest—a spaceman needs no sanctified ground, the incorruptible vault of space is as good a place as any and perhaps the more fitting for one of the first to travel its ways.

Well then—quickly. Johnny raised his hands.

But still—

Man has his pride and his vanity. Johnny, though not necessarily prone to inflated valuation of himself still has just enough vanity left to resent the thought of this anonymous snuffing out in the dark. There should be, he thought, at least some outward evidence of his passing, something like—a flare of light perhaps, that would in effect say, if only to one solitary star gazer: "Here at this position, at this instant, Johnny Melland, Spaceman, had his time."

The whimsy persisted. Johnny, casting about mentally for some means to the end recalled the thermite bomb for the WD cylinder and was hauling himself in to it when he remembered the charges for this lot had gone up with Sally Uncle One two days before. But now he'd actually touched the metal cylinder and, as though the brief contact had completed some obscure mental circuit, the mad idea was conceived, flared up into an irrepressible brilliance and exploded in a harsh bark of laughter.

One last push to his luck then, hardly worse than a gambler's last chip except that the consequences of failure were somewhat more certain. Either way he'd have what he wanted —survival or, in the brief incandescence of friction's heat, a declaration of his passing.

A waste disposal cylinder will carry the equivalent of about three tons of refuse. Its motor is designed to decelerate that mass by 1,075 mph in order to allow it to assume a descending orbit.

Less the greater part of the cus-

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tomary mass, it should be considerably more effective, and since he was already in what constituted a descent path, but for a few miles and a little extra velocity, there would not be the long fall afterwards to pick up what he'd lost.

From there on his plan entered the realm of pure hypothesis; except for the broad detail the rest depended on luck and whatever freakish conditions might arise in his favor during the operation. These, too, would be beyond his control and any move to take advantage of them would have to be instinctive, providing he was in any shape to do so.

The tendency to gnaw worriedly at a thousand disturbing possibilities drowned quickly in a rapidly rising sense of reckless abandon that possessed him. The prospect of positive action of any sort served to release any tension left in him and almost gayly he moved to set his plan in action.

He jimmied the timer on the rocket motor so it would fire to the last drop. The string of ribbon chutes he reeled in hand over hand stuffing it into the cylinder, discovering in the process why the chute Section hands at Base wore that harried look. The mass of slithering, incompressible white-and-yellow ribbon and its shrouds resisted him like a live thing; in the end Johnny managed to bat and maul the obstreperous stuff down the length of the tank. Even so, it filled it to within a couple of inches of the opening.

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Now he cut off a length of his life line and attached one end to the spring-loaded trigger release on the motor control, leaving enough to trail the length of the cylinder and double back inside when he wanted it. He blessed the economically minded powers that insisted on manual firing control on these one-shot units instead of the complex radio triggers beloved of the technical brains.

Making fast to the chutes was a major problem but eventually he managed a makeshift harness of the remainder of the safety line. He wound it awkwardly around himself with as many turns as possible, each returned again and again through the ring at the end of the master shroud.

By now he was casting anxious glances at the Earth below, aware that he must have passed apogee several minutes before and that not more than some twenty minutes were left before the low point of this swing would be near. He was grimly aware also that it must be this time or not at all. The air telltale was well through the yellow band and the next possible chance after this one was an hour's time away, when conditions inside the suit would be getting pretty sticky.

Jockeying the unwieldy cylinder into line of flight and making it stay there took a lot longer than Johnny counted on. With no other manual purchase than that afforded by his own lesser mass, the job proved almost impossible and he had to use his suit motor. This caused some concern over his meager fuel supply since his plan called for some flat-out jetting later on. In the frantic flurry of bending, twisting, over and under —controlling, the veneer of aplomb began to wear. Johnny was sweating freely by the time he had the cylinder stabilized as best he could judge and had gingerly worked himself into the open end as far as he could against the cushioning mass of ribbon chute. He took the trigger lanyard loosely in hand and craning his neck to see past the bulk of the cylinder he watched and waited.

To the experienced lift pilot there are certain subtle changes in color values over the Earth's surface as one approaches more closely the outer fringe of atmosphere. While braking approaches are auto-controlled, the pilot taking over only after his ship is in atmosphere, the conscientious man makes himself familiar with the "feel" of a visually timed approach—just in case—and Johnny was a good pilot.

Watching Equatorial Africa sliding obliquely towards him Johnny suddenly gave thought to a possible landing spot for the first time. Not that he had any choice but a picture of a cold, wet immersion in any of several possible bodies of water was not encouraging. The suit would probably float but which end first was a matter for conjecture and out of it he would be as badly off for Johnny could not swim a stroke.

Nor had he any clear idea how long it would take to slow down to a

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vertical drop. Able Jake made a full half swing of the globe to brake down but Able Jake was an ultra-streamlined object with many times the mass and weight of Johnny and his rig; furthermore the ships were controllable to a certain degree while Johnny was not. Beyond the certain knowledge that the effect of the chutes would be quite violent and probably short-lived, the rest was unpredictable.

He tried to shake off gloomy speculation, uneasily aware that much of the carefree confidence of the last hour had deserted him. In a more normal state of mind again he became prey to tension once more, a pounding heart and dry mouth recalling mercilessly the essential frailties of his kind. So, with aching neck and burning eyes he strained for a clear view past the length of the cylinder and—

There! The preliminary to the visual changes, a sudden sweep of distortion over the landscape as his angle of sight through the refracting particles became more shallow. Now was the time he had judged the throat vane gyros should begin their run-up.

He worked the lanyard back carefully, fearful an awkward movement might upset the cylinder's line-up, pulling the trigger lever over to half-cock where the micro switch should complete circuit with the dry power pack. There should be approximately one minute before the major color changes began, which was also the minimum time for gyro run up. Johnny resumed the watching and the waiting.

How long is a minute?

Is it the time it takes the fear-frozen trainee, staring glass-eyed at the fumbled grenade to realize that this one at his feet is a dud?

Or is it the time before the rock-climber, clinging nail and toe to the rock face with the rope snapped suddenly taut, feels it at last slacken and sees the hands gripping safely come into sight?

Perhaps the greenhorn, rifle a-waver, watching the glimpse of tawny color in the veldt-grass and waiting the thunder and the charge, could say.

They'd all be wrong. It's much longer.

Long enough for Johnny to think of a dozen precautions he could have taken, a dozen better ways to rig this or that. Long enough to worry about whether the gyros were really running up as they should. A thousand queries and doubts piled mountainously upward to an almost unbearable peak of tension till suddenly the browns and greens below flashed a shade lighter and it was time, and the savage snap on the lanyard a blessed relief and total committal.

In the few seconds after the firing of the prime and before the busy little timer snapped the valves wide open Johnny managed to slip his toes under the jet pedals to avoid accidental firing. At the same time he braced himself as rigidly as possible

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with aching arms against the walls of the cylinder.

He saw briefly the flare of the jet reflected off the remnants of his cloud of station stores before deceleration with all its unpleasantness began.

The lip of the cylinder's mouth swept up past his helmet as he was rammed deep into the absorbent mass of ribbon chute. This wasn't a padded contour chair under a mild 3G lift. The chutes took the first shock, but Johnny took the rest the hard way, standing bolt upright.

He found with some surprise his head was right down through the neck ring and inside the suit proper, his arms half withdrawn from the sleeves, knees buckled to an almost unbelievable angle considering the dimensions of the lower case.

He had time to hope fervently the cheap expendable motor wouldn't burn out its throat and send him cartwheeling through space, or blow the surrounding tanks before the blackout came down.

He came out of it sluggishly, to find the relief from the dreadful pressure almost as stupefying as the deceleration itself. While his conscious mind screamed the urgency of immediate action, his bruised and twisted body answered but feebly. The condition of complete weightlessness and the springy reaction of the ribbon mass was all that allowed him finally to claw himself out of the cylinder to where he could use the suit jet without fear of burning the precious chutes.

He was so tired. His muscles of their own accord seemed to relax intermittently, interfering with the control of his movements. Only the sudden sight of the Earth, transformed by a weird illusion of position from a bright goal to an enormous, distorted thing, looming, apparently, over him with glowing menace, spurred his flagging resolution to frantic activity.

He jetted straight back trailing his string of chutes behind him, then, before the last was free of the cylinder, kicked himself around to assume the original course once more.

At this stage it was no longer possible, even granted the time, to judge visually how near he was to the atmosphere. The uneasy feeling that he must already be brushing the Troposphere jarred his nerve so that he merely gave himself a short flat-out boost in the right direction before spinning bodily one hundred eighty degrees so that he was traveling feet first.

Reflected in the curved helmet face, the string of chutes obediently followed-my-leader around a ragged U-shape, the last—the small pilot-chute trailed limply around as he watched.

There could surely be but a few seconds left before the grand finale. Johnny found he was unconsciously holding his breath, and, as he deliberately inhaled long slow draughts of his already staling air, realized abstractly that he seemed to be attempting to meet his possible end with

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some degree of dignity if not with resignation, and wondered if he were the exception or the rule.

Possibly, he thought sardonically, because there is so little room for dignity in our living years, and was mildly surprised at an uncharacteristic excursion into the realm of philosophy.

There was a faintly perceptible tug on the harness. It was sustained and now there came a definite strain. Reflected for a moment in the helmet face was a glimpse of the lead chute slowly opening out like a gigantic flower.

Then swiftly, in half a breath the harness coils were tightening about him like steel fingers, the heavy ring at the end of the master shroud clashed against the back of his helmet and began a sickening, thrumming vibration there.

The harness encompassed his torso like a vise but his legs were unsupported and weighed what seemed a thousand tons. He could feel them stretching. Somewhere a coil slipped a fraction. His arms were jerked suddenly upwards and Johnny knew a sensation he'd never believed possible. At the same time his leaden feet crashed down on the jet pedals. For a few, brief, blessed moments the intolerable extension eased a fraction with the firing of the suit jets.

He cringed mentally from the thought of what was to come and thought hazily: "This is what the rack was like. This is going to be bad, bad, bad!"

It was impossible and Johnny went out with the last drop of fuel.

Somewhere there was a queer coughing sound like wind through a crevice. He strained to identify it but an awful agony swamped him and he fled before it back into the darkness.

And later still a thumping and a rushing, gurgling sound.

Dim, grotesque figures moved about him or swooped and hovered over him. He felt an unreasoning fear of them and tried to shut them out. They were holding him down, hurting him. One was pulling and twisting at his arm. He shouted and swore at it telling it to leave him alone, but it ignored him or didn't seem to hear. There was a sudden dull snapping sound and a little of the pain abated.

The figures flowed together and swirled around like some great oily vortex but never quite left him.

Then there was a time when they separated jerkily and became the hazy but definable figures of men in rough seaman's clothes. Johnny had never heard Breton French before; in his dazed condition the apparently insane gabble might well have been the tongue of another world and gave him little assurance. He hurt so badly and so generally that he could not have determined that he was lying down save for a view of white clouds scudding overhead.

Some of the men were holding up what looked like a crumpled parody

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of a man. He recognized it without surprise as the soaking remains of his spacesuit, battered and with tattered shreds of outer cover and insulation hanging in festoons.

A sharp, bearded face shot into focus abruptly, waving a hypodermic needle. It spoke English and observed passionately either to Johnny or itself that: "Name of a Spanish cow! What is it in men that they must abuse themselves so? Now here is one who was both squeezed and stretched alternately as well as hammered, dehydrated and almost asphyxiated, is it not? This will bear watching. It is alive but there will have to be X-rays in profusion."

It danced long sensitive fingers over the welts and bruises and commented bluntly that it was well the fishermen had returned his arms and legs into their sockets before he fully regained consciousness. It muttered and clucked to itself as it used the hypo which Johnny could not feel. "Formidable!"

The pleasant drowsiness came down just as he was identifying the queer smell as ozone, brine and good fresh air.

After a while they moved him to a small hospital in an upcoast town, where he slept much, suffered not a little and, even waking, viewed the world incuriously through drug-laden eyes. Finally they allowed him to waken fully and the sharp-faced doctor, together with half a dozen others from various parts of the world decided that, after all, he seemed to be surviving.

Johnny lay and itched intolerably in the cast that covered him from nape to thigh and listened to the bustling of the elderly nursing sister who, good soul, having never been more than ten miles from her town in her life, reminded him that it wanted but two days to Christmas and opined that: "Such a tragedy for M'sieu. To be so far from home!"

Johnny smiled at the ceiling, not daring to laugh yet, and sniffed at the salt sea air with its undertone of rank seaweed and gloried in it; even a chance whiff of that particular cigarette tobacco that only a Frenchman can appreciate. He thought that here, as across the water, night and day followed each other in their proper order and the ground was a solid thing beneath the feet.

Why—he could never be closer.

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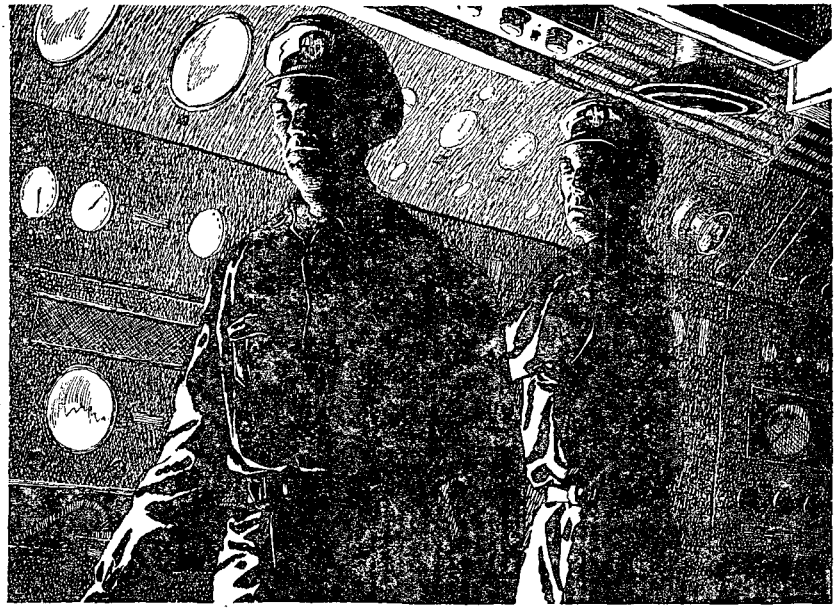

UNDER PRESSURE

Second of Three Parts. ***It made little difference, down a mile or more below the sea's surface, whether the sub's hull cracked, or one of the crew cracked—either would be lethal!***

BY FRANK HERBERT

Illustrated by van Dongen

SYNOPSIS

Oil starvation in a world at war has led to a new kind of privateer action: atomic submarines of the West operating in the ocean deeps are stealing lubricant from underwater wells driven secretly into the enemy's continental shelf.

But submarine wolf packs of the Eastern Powers are suddenly one hundred per cent effective against

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the West's privateers. Enemy agents are planting signal devices—"spy-beams"—on the oil raiders. Because the West needs oil desperately and needs also the morale boost of a successful mission, the Subtug Fenian Ram *is sent out. The* Ram's *crew is computer-rated most likely to succeed in running the undersea gauntlet.*

Captain of the Ram *is Commander Harvey Acton Sparrow, a forty-one-year-old bible-quoting career navy man whom Bu-Psych had been about to beach for suspected paranoic tendencies until he and his crew were top-rated by Bu-Comp.*

Bu-Comp's rating was qualified, requiring the addition of a psychological monitor to the subtug's crew, a monitor charged with keeping Sparrow and his crew in mental balance.

Ensign John Ramsey, a Bu-Psych electronics specialist, inventor of the emotional telemeter, *is chosen for the secret and delicate position of monitor. He becomes fourth man of the crew, replacing the* Ram's *previous electronics officer who went insane as the subtug returned from a deep-sea mission. Ramsey has tuned his telemeter—a device which records emotional variations—to instruments surgically implanted in Captain Sparrow. The captain believes the instruments contain only a new system for detecting spy-beams.*

Engineering officer of the Ram *is Lieutenant José Garcia, a British-educated Latin-American who is suspected by Security of being a spy. Garcia has told Sparrow he believes Ramsey may be a spy. Ramsey has orders to keep Garcia under surveillance, but holds little sympathy for Security's suspicions.*

First officer is Lieutenant commander Leslie Bonnett, much-married top gunnery man in the subservice. He is held from his own command by unresolved feelings of insecurity stemming from his childhood as an orphan foundling.

The Ram, *towing a collapsed plastic barge, heads for the hidden well on the undersea shelf of Novaya Zemlya, an island in the Barents Sea above Siberia.*

A sabotage attempt is discovered: a static spark arranged to explode an oil spray. The body of a Security officer is found in one of the tunnels of the shield wall between engine room and atomic pile. The officer has left a note which tells of an attempt to sabotage the reactor.

Ramsey awakens to the fact that he has been acting in an odd manner for a psychologist: fighting down a near pathological fear of the deeps in which the subtug operates—regions of water pressure near three thousand pounds to the square inch.

Sparrow wavers between belief that Ramsey is a Security officer and fear that he may be a spy.

A spybeam is discovered! It is an apparently normal electronic tube doctored to give away their location. Sparrow leaves it intact, discharges it into the ocean. The Ram *speeds away, leaving behind the spybeam*

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and a nest of homing torpedoes which sink two enemy submarines.

Now, Ramsey is wrestling with the problem of Captain Sparrow—a man who prays for the souls of the enemy submariners he kills, a man whose reactions as recorded by the telemeter are not normal. Ramsey's instruments reveal that the captain is held in iron emotional control. The Bu-Psych man suspects a survival adaptation which has made Sparrow a nearly mechanical part of the submarine: a human computer incapable of normal emotions and driven by religious fanaticism.

Weary with work and worry, Ramsey has fallen asleep on his bunk to dream of a giant surgeon who looks like Sparrow. The nightmare surgeon works over Ramsey, making the electronics officer another mechanical unit for the Fenian Ram.

PART 2

It was Garcia's watch.

Timelog reading: eight days, three hours and nineteen minutes.

Bonnett on standby, dozing on a tall stool in front of the control deck search board.

The *Ram* at cruising speed making twenty knots.

Garcia lounged against the guard rail in front of valve master control, eyes idly taking in the gauges, now and then a glance at the auto-pilot indicator.

The search board emitted a soft buzzing.

Bonnett's head snapped up. He looked to the green face of the scope at his left, kicked the switch which automatically silenced the *Ram*'s motors.

They coasted quietly.

"What is it?" asked Garcia.

"Metal. Big. Coming our way."

"One?"

"Dunno yet."

"Is it an EP sub?"

"It's the ghost of Joe Stalin reincarnated in the form of a steel whale," said Bonnett. "Shaddup, will you?"

His hand adjusted a dial and he looked to a gauge above it. "One. Coming fast like she owned the ocean. In these waters that means EP. Buzz the skipper."

Garcia pushed a button on the callboard.

Presently, Sparrow joined them, bending his tall figure for the aft doorway. He buckled his belt as he stepped across the control deck.

Bonnett nodded toward the gauges.

The *Ram*'s deck had been slowly tipping to starboard as she lost headway. Now, she was pointing down by the nose and the starboard incline was steep enough that Sparrow had to steady himself on the main grabrail. He swept his gaze across the search board, asked, "How far to bottom?"

"Too far," said Bonnett.

Garcia, one hand on the valve-board rail, turned toward them. "I hope you two decide what we're going to do before we turn turtle. We're almost at a standstill."

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Sparrow's gaze again went to the search gauges. The other sub was less than three miles distant, coming fast. As he looked, the detection equipment suddenly resolved its signal into two images.

"Two of them traveling tandem," said Sparrow.

Through his mind sped a quotation from the tactical handbook: "Submarines stalking each other under the sea are like blindfolded adversaries with baseball bats, locked in a room together, each waiting for the other to strike."

"They're going to pass inside of a thousand yards," said Bonnett.

"If they hold their present course," said Sparrow. "And that could be a trick to throw us off guard."

"They must be asleep not to've spotted us before this," whispered Garcia.

"Their metal detection gear isn't too hot," said Sparrow. He turned on Garcia. "Joe, drop four homing torps, five minute delay, set to swing around in front of them. Then give us just enough push to get underway and take us down to absolute."

Garcia's hands moved over the control board, adjusting a vernier, setting a dial. He slapped one hand against a switch, turned to the drive controls. The *Ram* picked up speed slowly, nose pointing into the depths. The deck righted.

Sparrow and Bonnett watched the detection gear.

"Drift," said Sparrow.

Bonnett's hand swept over his drive switch. They floated downward silently.

"Give us a little more," said Sparrow.

Again the engines took up their slow turning.

Garcia whispered, "They're not blind; they're deaf!"

Sparrow held up a hand to silence him. He glanced up to the big static pressure gauge: 2790 pounds to the square inch . . . 2800 . . . 2825—

Slowly, the indicator hand swept around: 2900 . . . 2925—

Above the gauge, the flat bronze plate stamped with the *Ram*'s weight and specifications. Someone had used red paint to fill the indentations showing pressure limit: 3010 pounds.

The hand of the dial pointed to 2975 . . . 3000—

Perspiration stood out on Garcia's face. Bonnett pulled nervously at an earlobe. Sparrow stood impassively, feeling the ship around him. "Ease her off," he whispered. He wet his lips with his tongue.

The knowledge of the outside pressure was like an actual physical weight pressing inward against his skull. He fought against showing his feelings.

The dial steadied at 3008, slowly climbed to 3004, stayed there.

Bonnett whispered, "They're almost on top of our—"

A dial fluttered wildly and they felt the *whump!* of a detonation pound through the hull. Sparrow's

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glance darted to the static pressure gauge: it made a stately fluctuation through 3028, back to 3004.

Garcia whispered, "I heard that the *Barracuda* took 3090 before she imploded."

"There's a bigger safety factor than that," said Bonnett.

Sparrow said, "May the Lord take their souls and grant them mercy. Even as it may come to pass with us. God forgive us that we do this not in anger, but out of need."

Garcia fingered the beads of his Rosary in his pocket.

A sudden thought passed through Sparrow's mind. He looked down at his first officer. "Les, what do you do when the heat is on?"

"Huh?" Bonnett glanced up at him, back to the dials.

"What do you think about?"

Bonnett shrugged. "I remind myself I've been married four times—four beautiful babes. What more could a man ask?"

"Every man to his own philosophy," said Sparrow.

Ramsey entered the control room, took in the scene, whispered, "The silence woke me up. Are we hunting something?"

"And vice versa," said Garcia. "Get in here and help me on the board."

"You were not called to duty," said Sparrow.

Ramsey hesitated.

"Get in here with Les," said Sparrow. "I'll stand by with Joe." He backed away from the control.

Ramsey took the vacated position.

Sparrow moved up to stand beside Garcia.

Bonnett looked at Ramsey out of the corners of his eyes. "I'll clue you in on something, Junior," he said. "This is too much like playing grab-tail with a panther for me ever to become addicted to it."

Sparrow said, "We can't be traced from the track of our fish. They were on a curving course before they could've been detected."

"That second boy out there could've gotten a shock-wave echo from the blast," said Bonnett. "He's just drifting now. He's already put out his anti-torp volley and it should—"

Three shock waves washed over them in rapid succession.

"That would be our fish being knocked out," said Sparrow. "Any breaking up noises from that EP?"

"Negative," said Bonnett.

"Then they have our position now from the echo," said Sparrow. "Send out a detection scrambler and get our anti-torp volley off." He slapped Garcia on the back, said, "Evasive action. Force speed."

Ramsey standing beside Bonnett hit a series of switches with the heel of his hand. A cloud of tiny torp-homing exploders swept out from the *Ram*.

Bonnett kicked the control which sent out a dummy torpedo carrying signal equipment to scramble detection systems.

"Why couldn't I have taken a nice

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safe job in a nitrox factory?" Garcia moaned.

"You guys who want to live forever make me sick," said Bonnett. "Here you are in a nice perambulating sewer pipe with ple—"

"Up" barked Sparrow. "If we get into close quarters I want a bigger pressure margin."

Garcia complied. The deck slanted upward.

Ramsey said, "What makes you think—"

"We're coming out of that scrambler's field," said Bonnett.

"Fire another along our foreward path," said Sparrow. Again he slapped Garcia's shoulder. "Right rudder and drift."

Garcia pulled the wheel right, straightened it, shut down the drive. Slowly, the *Ram* lost headway. Again the deck tilted to starboard.

"We've gotten sloppy on our trim," said Sparrow.

Bonnett leaned toward Ramsey, whispered, "That guy's a genius. We coast along the edge of the first scrambler's field. The one we just sent out will leave a track for the other boys to follow and they'll—" He broke off, staring at the detection system, eyes widening. "Skipper!" he husked, voice hanging on the edge of horror. "They're right on top of us—force speed. Going overhead now. Not more than one hundred feet!"

Sparrow shouldered Garcia aside, kicked the *Ram* into force speed, swerved it into the wake of the other sub. To Bonnett, he said, "Keep us on their tail. Gently, friend—gently."

Garcia whispered, "I heard of this happening once with the old *Plunger,* but I never thought I'd see it myself."

Ramsey said, "Their blind spot. They can't hear us in the turbulence of their own wake."

Bonnett's voice came calm and steady: "Two degrees port."

Sparrow swerved the *Ram* to follow.

Ramsey pointed to the oscilloscope.

Bonnett followed the direction, said, "Skipper, off to starboard is a whole wolf pack. They're converging on that last scrambler we sent out."

"Too close for comfort," said Sparrow. With one hand he eased down drive speed; with the other he punched the controls to arm a torpedo. "Give me minimum range," he said. "This has to be fast. As soon as the blast reaches us, fire scrambiers to the four points of the compass.

Bonnett acknowledged. "One hundred yards," he said. "One twenty-five . . . one fifty . . . one seventy-five . . ." He glanced to the secondary scope. "Any second now that pack will be getting two signals from us and one of the signals won't fit IFF. Two fifty . . . two seventy-five—"

Sparrow fired the single torpedo, killed the drive, began counting:

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"One, two, three, four, five, six, seven, eight, nine, ten, elev—"

The concussion shook the *Ram*.

Bonnett fired the scramblers.

Ramsey's ears were ringing.

Sparrow kicked on drive to force speed, brought the *Ram* about in a tight circle, coursing upward. With one hand, he pushed Garcia into the control position, stepped back. "They'll be expecting us to dive," he said. "Blow the tanks."

Garcia palmed the switches and the *Ram* bounced to the lift.

Sparrow said, "Les, give me a fifty-foot warning on the edge of the scrambler field."

"Right," said Bonnett. "We've a ways to go yet."

Bonnett caught the puzzled look on Ramsey's face, said, "They taught you things in sub-school, but they never taught you this, did they?"

Ramsey shook his head.

"We're going to float up," said Bonnett. "We may be walking on the ceiling before we get there, but we're going to do it silently."

Sparrow looked to the static pressure gauge: 1200 pounds—above the 3000-foot level. He glanced inquiringly at Bonnett, who shook his head.

The seconds ticked away.

Bonnett said, "Now!"

Garcia killed the drive.

Sparrow wiped his face with his hand, looked startled when his hand came away bloody. "Nosebleed," he said. "Pressure change was too rapid. Haldane tablets, everyone." He fished a flat green pill from a pocket, popped it into his mouth. As always, his reaction was sudden nausea. He grimaced, held the pill down by will power, shuddered.

Ramsey choked on his pill, coughed, fought it down.

Bonnett spat into his handkerchief, said, "Human beings weren't meant to take this kind of a beating." He shook his head.

The *Ram* began to tip gently to the right.

Sparrow looked at Ramsey, said, "Johnny, go over to the left there."

Ramsey complied, thinking: *What a way to get on a first-name basis! I'd sooner stay a dryback.*

As he passed Garcia, the engineering officer spoke the thought aloud: "Bet you wish you were still Junior-Ramsey."

Ramsey smiled faintly.

The deck's tipping slowed, but did not stop.

Sparrow nodded to Bonnett. "Hand pump. Start shifting some water. Slow and easy."

Bonnett stepped to the aft bulkhead, swung out a crank handle. Sparrow took over the search board position.

Slowly, they steadied on an even keel, but now the nose began to sink. Then the deck began to slant slowly to the left.

Sparrow glanced at Ramsey, nodded toward the aft bulkhead on his side. "Take over fore-and-aft stabilization. Easy does it. No noise."

Ramsey moved to obey. He looked at the pressure gauge: 840 pounds. They were above the 2000-foot level.

"We can maintain some sort of

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trim until we hit wave turbulence," said Sparrow. "Then we may have to risk the drive."

Gently, the *Ram* drifted upward, tipping, canting.

Ramsey found the rhythm of it. They couldn't hold her in exact trim. But they could rock her to a regular teeter-totter rhythm. He grinned across at Bonnett on lateral stabilization.

The deck suddenly stopped a leftward counter motion and heeled far right, came back again, nose rising; again she heeled to the right. A hissing sound resonated through the hull.

The screen on the forward bulkhead—tuned to the conning TV eye—showed milky green.

Sparrow stood at the controls, one hand on the rail. He stared upward at the screen.

When's he going to give us headway? Ramsey wondered.

This time the *Ram* heaved far over to the left.

For one frightening moment, Ramsey looked directly down into the pipe and conduit maze against the port pressure hull. *We're going over,* he thought.

But the *Ram* came back, sluggishly righting. The bulkhead screen broke free to foam, cleared to reveal fog and long, white-capped rollers. The *Ram* pitched and bobbed in the seas.

"I agree with you, skipper," said Bonnett. "One way of dying is as good as another. They'd have heard us sure."

Garcia worked his way along the handrail, fighting the uneasy motion of the deck. "If we could rig a sea anchor," he said.

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"We already have one," said Sparrow.

Garcia blushed. "The tow!"

"Thank you, Lord, for that lovely fog," said Bonnett.

The *Ram* swung downwind from her tow in a wide, rolling arc, jerking against the lines like a wild horse at a snubbing post.

"More line on the tow," said Sparrow. He nodded to Garcia, who jumped to obey.

The motion of the deck smoothed.

Sparrow kept his gaze on the detection gear. "What's our heading, Joe?"

"Near fifty-eight degrees."

"Wind's favorable," said Sparrow. "And those boys down under haven't changed course."

"They're still snooping after our last scrambler," said Garcia.

"Time for you to go off watch, Joe," said Sparrow. "I am relieving you."

"Want me to bring up some sandwiches before I sack down?" asked Garcia.

"Ham and cheese," said Bonnett.

"No thanks," said Sparrow. He studied the sonoscope on the search board. "We'll drift with this wind until we no longer get signals from that pack."

Ramsey yawned.

Sparrow hooked a thumb toward the aft door. "You, too. That was a good job, Johnny."

Ramsey said, "Aye." He followed Garcia down the companionway, muscles aching from the unaccustomed exercise at the ballast pumps.

Garcia turned at the wardroom door, looked at Ramsey. "Chow?"

Ramsey steadied himself with one hand against the bulkhead. Beneath him, the deck rolled and dipped.

"These tubs weren't designed for the surface," said Garcia. "What breed of sandwich?"

The thought of food suddenly made Ramsey's stomach heave. The long companionway appeared to gyrate in front of him, rolling counter to the motion of the deck. He capped his mouth with a hand, raced for his quarters. He reached the washbasin just in time, stood over it retching.

Garcia followed him, pressed a blue pill into his hand, made him swallow it.

Presently, the surging of Ramsey's stomach eased. "Thanks," he said.

"In the sack, Junior."

Garcia helped him grope his way into his bunk, pulled a blanket over him.

Seasick! I'll never live it down! thought Ramsey. He heard Garcia leave. Presently, he remembered the telemeter. But he was too weak, too drowsy. He drifted off to sleep. The motion of the *Ram* became a soothing thing.

Rockabye . . . rockabye—

He could almost hear a voice. Far away. Down a tunnel. In an echo chamber.

"The ship is my mother. I shall not want—"

When he awakened it was the call to watch and he had a scant moment

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in which to glance at the telemeter's tapes.

Sparrow had returned to the pattern of rigid control.

It was as though Ramsey's subconscious had been working on a problem, chewing it, and this was the final datum. The answers came spewing up to his conscious level.

He knew what he had to do.

Twenty-three hours the *Ram* drifted downwind, angling away from Iceland to the northeast. A gray speck on gray and foam. And behind her, barely submerged, the green surge of their tow, a sea monster escaped from the deep.

In Ramsey's second watch they passed within two miles of a radioactive iceberg, probably broken from the skerries of the northeast Greenland coast. Ramsey kept radiation snoopers tuned to the limit until they were out of range. The berg, its random contours catching the wind like a sail, was almost quartering the gale. It pulled away from the *Ram* like a majestic ship.

Ramsey noted in the log: "Current setting easterly away from our course. We did not cross the berg's path. Outside radiation: 1800 milli-R."

Garcia came across the control room. "Safe yet?"

"Clear," said Ramsey.

Garcia looked to the screen on the control bulkhead, the view of gray rollers. "Moderating."

"If the fog will just hold," said Ramsey.

Sparrow came through the aft door, his lank form seemingly more loose-jointed than usual.

He's relaxed, thought Ramsey. *That fits. What EP commander would dream of looking for us up here? We're too low in the water to show on a shore screen.*

"All quiet, skipper," he said.

"Very good," said Sparrow. He looked to the timelog: nine days, three hours and forty-seven minutes. "Joe, how long since you've had a signal from our friends?"

"Not a sign of them for almost ten hours."

Sparrow glanced at the sonoran chart. The red dot stood at sixty-six degrees, nine minutes twenty seconds north latitude, two degrees, eleven minutes west longitude. He nodded to Ramsey. "Get us under way, if you please. Surface speed. Quarter throttle. Keep us under eight knots."

Ramsey moved to obey.

The *Ram* shuddered to a wave impact, fought up the slope of a sea. They gathered headway sluggishly.

"She answers the helm, sir," said Ramsey.

Sparrow nodded. "Course thirteen degrees. We've drifted a bit too close to the Norwegian coastline. The EPs have shore-based listening posts there."

Ramsey brought the subtug around on her new heading.

"We'll stay on the surface as long as we have fog," said Sparrow.

"Our guardian angels are working overtime," said Garcia.

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"I wonder if they have a union?" asked Ramsey.

Sparrow looked to the timelog: nine days, four hours. He caught Garcia's attention, nodded toward the timelog and then toward the helm. "Take over, if you please, Joe."

Garcia took the helm from Ramsey.

"You are relieved," said Sparrow.

Ramsey felt a wave of fatigue sweep through him. He remembered what he had to do, fought it down. "We'll be there soon," he said.

Sparrow frowned.

"None too soon for me," said Ramsey. "I feel like we're living on borrowed time. I want our payment in the bank—a whole load of that sweet oil."

"That will be enough," said Sparrow.

"You afraid I'm going to give away a nasty old Security secret?" asked Ramsey.

Garcia darted a puzzled glance at him.

"Go to your quarters," said Sparrow.

"Righto," said Ramsey, copying Garcia's accent. He made his tone as insolent as possible without coming to actual insubordination, turned toward the aft door.

"I'll wish to speak with you before your next watch," said Sparrow. "We're long overdue for an understa—" He broke off as a red warning light flashed on the reactor system's *scram board*. The light winked green, then red, then green.

Garcia saw it, too.

Ramsey turned back to the control bulkhead, caught the last flash from red to green.

"Something's loose in the pile room," said Sparrow.

"That torpedo shock we took," said Ramsey.

"More likely the pounding we've had from these seas," said Garcia.

"That's circuit 'T' of the secondary damper controls," said Sparrow. "Right side forward. Get Les up here on the double."

Garcia pushed the alarm buzzer.

"Try the screens," said Sparrow.

Ramsey moved back to the helm, took it. Garcia glanced at him, moved to the screen controls, began hitting switches.

Bonnett entered. "What's up?"

"Something loose in the pile room," said Sparrow. "It's 'T' circuit."

"Right side forward," said Bonnett. He moved to get a better view of the screens, caught the handrail to steady himself against the rolling of the deck.

Sparrow said, "I'm going forward." He looked at the scram board. The light winked at him: red, green, red, green, red, green— "Les, come forward with me and help me into a suit. I'll have to crawl the right side tunnel, use the manuals and mirrors."

"Just a minute, skipper," said Garcia. "Look at that." He pointed at a screen.

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Sparrow stepped to his side.

"Central damper controls," said Garcia. "See. When we pitch into the trough of a wave it seems to—There!"

They all saw it. The long hanging arm of the manual damper control swung free like the multi-jointed leg of an insect. It exposed a break at the top elbow-hinge. The upper bracing flapped outward to the sway of the ship.

"It was wedged against the hinge," said Garcia. "Now it's broken free again." He looked at the scram board. Red, green, red, green, red—

Each time the light flashed red, the swinging arm touched a control circuit cable. A blue arc of electricity splashed upward.

Garcia pointed to the lower half of the screen which showed the base of the control system. "There's the real trouble. The whole control base is twisted. See those sheered bolts."

Sparrow whirled to the forward hatch, undogged it. "Les, I've changed my mind. Stay here with Johnny on the main board. Joe, come with me." He glared at Ramsey, hesitated, then said, "Take us down below wave turbulence."

Ramsey's hands went to the controls: diving planes two degrees, compensating system open, hull pressure holding. He found that it was better to let his body react, to accept the results of his training, secure in the knowledge that this way he would be right.

Sparrow went through the door, out onto the engine-room catwalk. Garcia followed.

Ramsey activated the engine-room scanners to follow their movements. *What a time I picked to go into my act,* he thought. He gave a mental shrug. *But one time's as good as another.*

"We're going to make it," said Bonnett. "Nothing can stop us."

Startled, Ramsey darted a glance at the first officer.

Bonnett was staring at the screen. Ramsey followed the direction of his gaze. Sparrow and Garcia went scrambling down the ladder to the right-side tunnel. Sparrow jerked open the door to the bulkhead locker, swung out an ABG suit on its traveler rack.

"The EPs are crazy to think they can beat him," said Bonnett. "He's like a god!"

Something in Bonnett's voice—

Ramsey fought down a shudder.

The screen showed Garcia helping Sparrow into the bulky suit.

Ramsey turned back to his controls as the subtug steadied. He found the need to say something, said, "We're out of wave turbulence."

Bonnett looked at him. "Do tell." He turned his attention back to the screen.

Ramsey adjusted the controls, brought the deck to level.

Now, Sparrow was completely sealed into his suit. He turned, clumsily, helped Garcia with his.

What does the telemeter show?

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Ramsey wondered. *Is Sparrow under control? Or is the wild feedback starting?*

In the heavy suit, Sparrow felt the perspiration begin to roll off him. His fingers seemed unwilling to obey him as he assisted Garcia. *Damned sweat suits! There!* The final seal went into place.

Sparrow took a deep breath, spoke into his suit mike: "Testing . . . testing. Do you read me, Les?"

The captain's voice boomed out of the speaker on the control deck. Ramsey turned down the volume.

Bonnett spoke into his chest mike: "Loud and clear."

"Joe," said Sparrow, "are you getting me?"

"Righto, skipper."

"Now get this, Les," said Sparrow. "If that damper arm swings out too far it'll begin clubbing the side of the pile. Monitor me on your screen. I might not be able to see a position change soon enough."

Bonnett looked to the screen showing the reactor room. "It's quiet now, skipper. Resting against the first-stage clamps."

"Those bolts are sheered off, though," said Sparrow. "The whole unit could fall over onto the pile."

Bonnett studied the screen. "Skipper, there's a chance you could catch the main drive bar with the grapple of the forward manuals." He bent closer to the screen. "It'll be a near thing. You'll have to snake past that broken hinge."

"How much clearance?"

"Maybe six inches. No more. The mirror's at a bad angle."

"Talk me in," said Sparrow. "We can do it." He turned, undogged the tunnel door, snapped on his helmet light. "Joe, stay here unless I call you." He reached a hand into the tunnel, found the filter system switch, started it. He plugged his suit hose into the traveler, tested the air.

Garcia said, "I'll time you. Have Les monitor the tunnel radiation."

Bonnett, listening to the conversation over the intercom, said, "I'll give you the time-over-radiation from here." He twisted a dial, plugged in a jack, tested the circuit.

"I'm going in," said Sparrow. He bent, slid into the tunnel. "I'll give you a running commentary when I reach the manuals, Les. Get everything on tape. Base will want a complete record of this."

"Take it slow and easy, skipper," said Bonnett.

Sparrow said, "Joe, dog that tunnel door behind me. If that base falls to the right it'll smash the end-plug. There'd be hot stuff all over the place."

"Righto."

A faint thump behind Sparrow and a feeling of pressure change told him when Garcia had complied. Sparrow felt the isolation like a physical band tightening on his forehead. Perspiration rolled down his cheeks, down his nose. His clothes were damp with it, clinging to him.

Garcia's voice came over the

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phones like a sound from another world. "What do you see, skipper?"

"Tunnel's clear. Nothing hot yet." His helmet light cut a bright path through the metallic darkness.

It's another birth canal, he thought. And he remembered all the times he had crawled the mock-up tunnel at training school without ever encountering that thought. *There's a first time for everything: a first time to be born, a first time to die.* He longed to wipe the perspiration from his forehead. *Lest ye be born again ye shall not enter—*

The light picked up the safety door near the end of the tunnel. This was the limit of the bulkhead. Beyond that was the lead *soda straw* jutting into the pile room. And at the end: the manuals. He undogged the door, swung it back into its recess.

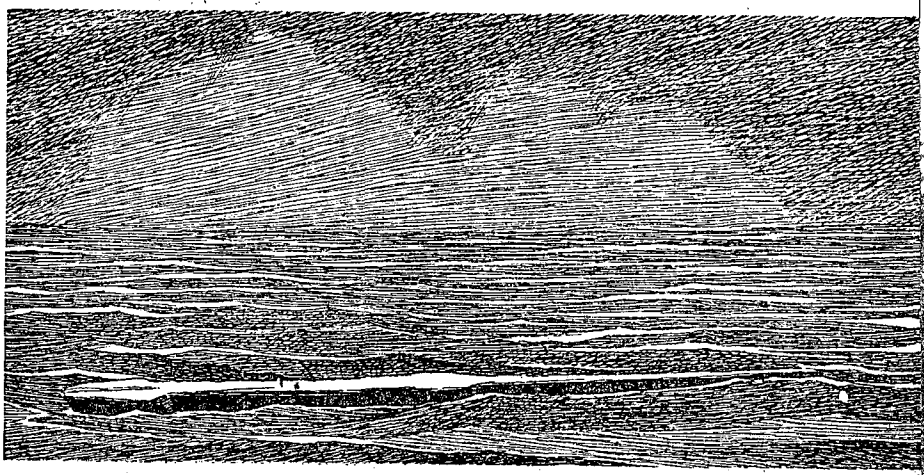
Pile room floodlights cast their blue glare onto the tunnel floor ahead of him, reflected through the mirror system in a weird splotching of brilliance and shadows. Sparrow inched his way into the glare.

"I am at the manuals," he said. He turned onto his back, fighting against the terror that threatened to overwhelm him. Out there in the blue glare of the pile room was . . . what? The world and all its threats.

Garcia's voice came over the intercom: "Are you O. K., skipper?"

Sparrow took a deep breath. "Yes."

I'll pretend I'm still in school, he thought. *This is a test. I have to pass or take a black mark. They've yanked the control units free of their base and I have to make repairs under simulated action conditions. Old Lieutenant Maurey is back at the tunnel mouth hoping I'll fail. That's not really a reactor out there; it's just a mock-up. They wouldn't risk an unimportant student with the real*



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thing. They have to wait until you've had all that expensive training and it'd cost something to lose you. Then—

"Skipper?" Les's voice, metallic over the phones.

"Yes?"

"Are you ready?"

"Just a moment, Les."

"Right."

Sparrow slipped his hands into the fitted grips of the manual controls, pulled the stud which hooked him into the grapple. He pulled back with his right hand, watched in the mirror as the grapple came into lift position.

"Les?"

"I see it, skipper. Bring it up about three feet. Line it up with the springbar, but keep it back away from the broken hinge."

Sparrow pulled down on the right grip, turned it slightly to bring the hydraulic booster into play. The grapple darted upward. *Too fast!* Sweat popped out on his forehead.

"A little slower," said Bonnett.

Sparrow whispered, "Lord, I am like David. I am in a great strait: let us fall now into the hand of the Lord; for His mercies are great: and let me not fall into the hand of man. Stay now Thine hand. I have sinned and I have done wickedly: but these sheep, what have they done? Put Thine hand over mine, Lord. Guide me."

Steadiness came to him.

"Did you say something, skipper?" asked Bonnett.

"I'm all set, Les. Guide me in."

"O. K. You have to come up about six inches and to the left about an inch. Take it slow."

Sparrow lowered the thrust of the hydraulic booster, put his muscle into the grip. The manual arm went up slowly, paused, shifted to the left.

"Right on, skipper. Bring it forward three feet and lock it while you lift the rear hinge section into place."

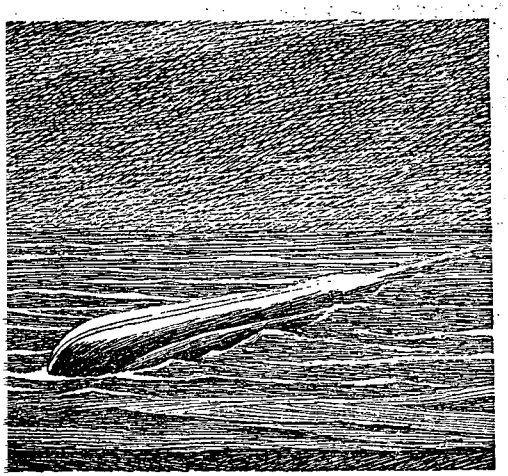
The grapple moved as though it were a part of his body. He twisted his left grip to lock the end section, eased the next element of the grapple arm into alignment.

"How's that?"

"Perfect. Now can you lift the whole arm about an inch? You're a little close to that broken hinge."

"I can't see the end of the grapple and the next element at the same time, Les. I'd better watch the element."

"O. K. Fine it down and bring



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the grapple end up a quarter of an inch at a time."

Sparrow grunted as he made the first lift.

"That was a half inch, skipper. One more exactly like it."

Again Sparrow grunted as he moved the grip.

"A hair over, skipper, but you still have clearance."

"Do you want me to fine it down?"

"No. Let it stand there. Now bring the grapple end past the hinge. One straight push about three feet."

Sparrow twisted his head to get a view of the grapple in the mirrors. It looked as though it would smash directly into the broken hinge. *Poor angle of view,* he thought. *How'd a piece of bad planning like that get by?* He lifted his right hand grip. The grapple surged forward, stopped.

"Hold it right there a second, skipper."

Sparrow heard mumbling over the phones.

Bonnett's voice returned: "You'll have to get three elements of the grapple arm past that break before you can drop the tip. Better align the next element."

Sparrow brought up the next hinged section, straightened it. "How's the alignment?"

"Right on. Bring it forward."

He complied, his hands moving the controls with increased sureness. The next element came up, was aligned, sent forward.

"Another foot forward, skipper."

He moved the grapple arm.

"Now come's the ticklish part. Drop the end at number three joint. Take it down slowly and stop when I tell you."

Sparrow bent the end elements downward. It was almost as though he could feel the moving part as he could feel his own arm. He sensed the position and stopped it while Bonnett was forming the order on his lips. The grapple end now was out of sight below the control base. It would take four adjustments of the mirrors to bring it back into view.

"You're about ten inches above the main drive bar. To reach it, you'll have to angle down with that section spanning the broken hinge."

"I don't dare jar that hinge," said Sparrow. "There's a lot of leverage that far up. I could break it right off."

"I've used the calipers on the screen," said Bonnett. "You'll have about an inch to spare."

Sparrow felt the fatigue in his wrists and forearms, whispered, "Just a little longer, Lord. We're making it."

"You ready?" asked Bonnett.

"Yes. Talk me down."

"O. K. Take the tip toward you about four inches."

Sparrow moved the grapple.

"Now, down six inches."

Sparrow eased the tip downward,

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felt the sureness of his control, said, "How's the lateral alignment?"

"Half inch to the right."

He shifted the descent angle, continued down with the tip. "How's the upper clearance?"

"You still have two inches."

He felt the grapple jaws touch the drive bar, lowered them onto it, gripped the bar.

"Skipper, you couldn't've done that better if you'd had your own hand out there."

Sparrow locked the grapple into position, brought up secondary grapples to brace it. He slid backward down the tunnel until he could reach the manual controls at number two position, reached up with a short grapple and clamped it onto the broken unit. The control base shivered.

"Lordy," said Bonnett. "It would've gone right over without the bracing on that drive bar."

Sparrow swung an extension torch into place above the broken hinge, locked it into position, lifted the broken end until the sheared sections touched. He started the torch.

"What're you going to do, skipper?"

"Fuse it solid at the hinge. Only thing I can do now. There's enough play in the other elements to almost compensate for the lost mobility. We'll still be able to cover more than eighty per cent of this pile face. The manuals will cover the rest."

"What about the base?"

"I'm going to knock the sheered bolts right on through into the catch basin." He lowered the torch, playing its flame onto the sheared hinge. At the molten-moment, he cut the torch, crushed the broken elements together. The repair formed a wedge-shaped cup. He sprayed the inside with brazing flux, brought up brazing rod and filled the cup.

"That looks like it'll hold," said Bonnett. "I've been examining the base. It doesn't appear to be warped, but it's out of alignment. You'll need a spreader jack at the aft end."

"Right. What's the inclination?"

"About one degree. Put the replacement bolts along the inside face first. They'll hold it while you drop the drive bar."

"I've a better idea," said Sparrow. "Watch closely and tell me if anything starts to go wrong."

"What're you going to do?"

"Drop the bolts into place along the inner face, then throw a little torque into the drive bar. The thrust against the grapple will push the base back into position."

"That's risky."

"No worse than thrusting a jack against the base of the pile to horse that thing into position. This way we don't touch the pile."

Sparrow continued to speak as he worked. "Rule one of pile room repair should be: Don't touch the reactor unless you absolutely have to."

"You have nine minutes, skipper," said Bonnett. "You should be on your way out in five minutes."

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"That's another reason for doing it my way," said Sparrow.

"Couldn't Joe finish it?"

"Only if he has to. Best not to have two of us on the cooling-off list."

He touched the drivebar switch. The control base rocked against its grapple braces. Metal protested. Two of the bolts dropped into position. Sparrow slipped nuts onto them, drove them tight with a motor wrench. Again he rocked the base with the drive bar. The remaining bolts slipped home.

Sparrow's fingers flew over the manual controls as he completed the job. He disengaged the grapples, swung the repaired control arm out of the way, clamped it.

"Two minutes, skipper. On your way, right now!"

Sparrow released the last temporary brace, dropped it, slid backward down the tunnel, closed and dogged the door at the bulkhead limit. His helmet light was a pale flame after the blue glare of the tunnel end. He crawled backward, heard Garcia undog the door behind him, felt the other man's suited hand on his legs helping him the last few feet.

Bonnett's voice came over the phones: "You went about a minute over. Get down to the sickbay and take your shots."

Sparrow grinned. It was good for Les to give orders; eased his tensions.

"On the double, skipper," said Bonnett. "Every second's delay means that much more time cooling off for you."

Sparrow fought down a feeling of irritation. Under rule Ninety, Bonnett was technically in command when his superior officer had taken an overdose of radiation. But one minute!

Garcia ran a snooper over him, working silently, gesturing for Sparrow to turn. The engineering officer straightened, racked the snooper. "Into that decon chamber." He unhooked Sparrow's hose from the tunnel system, closed the door and dogged it.

Sparrow clumped into the decontamination chamber, felt the surge of foaming detergent around him.

"Joe, what's the delay?" Bonnett again.

"He's in decon now, Les. Thirty seconds more."

"Cut it short, Joe. Ramsey is on his way down with the needle to give him his shots there. It'll save a couple of minutes."

Ramsey came out on the catwalk above them, carrying a radiation first-aid kit under his arm. He dropped down to their level, helped Garcia break the seal on his suit.

Sparrow came out of the chamber without his suit, frowned at the kit in Ramsey's hand.

"Bend over, skipper," said Ramsey.

Sparrow obeyed, dropped his trousers, winced at the needle. "Just don't enjoy yourself, Johnny," he said.

Ramsey extracted the needle,

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wiped the bare skin with disinfectant. "That does it and I hope you never have to do the same for me."

The lifting of tension about Sparrow was an almost physical thing.

Ramsey replaced the hypodermic in the kit, sealed it.

"Let's go," said Sparrow.

Garcia hung his ABG suit in its locker, followed them up the ladder.

Ramsey thought, *What's on the telemeter? Lord, I thought he'd never come out of that tunnel.*

They stepped out onto the center catwalk, headed for the control room. Abruptly, the giant motors around them fell silent. Sparrow broke into a run, ducked through into the control room. Ramsey sprinted after him, went through the door on Sparrow's heels.

Bonnett stood at the searchboard, one hand on the drive controls. His eyes were on the oscilloscope of the limit sono-finder. He spoke without turning: "Signal. At extreme range. We've lost it."

"By now they must have a rough idea of our course," said Sparrow. "They're quartering the area. What's the depth?"

"We're over the sub-arctic shallows," said Bonnett. "Bottom's about three hundred and fifty fathoms."

"Too shallow for us to lie doggo," said Sparrow. "They could range too close for—"

"There it is again," said Bonnett. He nodded toward the scope, adjusted two flanking dials. "Northeast. A pack by the noise. Damn! Lost them again. That's probably a school of fish between us."

"Head for the Norway Basin," said Sparrow. "We need deep water." He glanced at the sonoran chart. "Course nine degrees."

Bonnett engaged the drive, swung the helm to the left until they were on the new course.

Sparrow stepped to his nav-plot board, bent over it, figuring. Presently, he straightened. "Estimating time of arrival two hours and six minutes." He turned. "Johnny, stay with search here. We've the range on them, but not so much that we can afford to get careless."

Ramsey moved to the search board.

Garcia stepped through the door from the engine room. "The real danger is an EP that lies doggo until we're in range," he said.

"It's a big ocean," said Sparrow.

"And a small world," said Garcia.

Sparrow looked at the radiation kit which Ramsey had placed on one of the control board stools. He glanced at his wrist watch. "Does someone have a timer set for my next shots?"

"I have," said Ramsey.

"Get what rest you can, skipper," said Bonnett. "I'll have a look at you as soon as we find a sitting spot."

"I can do it," said Garcia.

Bonnett nodded. "O. K."

"Timer's in the kit," said Ramsey.

Garcia picked up the sealed box,

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gestured for Sparrow to precede him aft.

They're worried about me, thought Sparrow. *But one minute over isn't that important.*

Ramsey noted the proprietory attitude of Garcia and Bonnett toward Sparrow, realized abruptly that he shared it. *He's our skipper,* he thought.

Sparrow and Garcia went aft.

The *Ram* crept onward.

"It's a little deeper," said Ramsey. "We're over the hump."

"Sill depth across here runs four hundred to six hundred fathoms," said Bonnett. "When we reach six hundred we'll be close to the basin slope."

"It's four hundred and fifty now."

"A bad stretch," said Bonnett. "You'd expect the EPs to be ranging this area in net formations."

Garcia slipped into the control room. "Les."

"How is he?"

"Are you sure it was just one minute over?"

"Certainly I'm sure. What's wrong?"

"Very low white count. It looks like closer to half an hour over."

"Any burns?"

"No indications yet."

"It could be that he didn't recover well from handling that Security lieutenant," said Ramsey.

"That's what I was thinking," said Garcia. "I gave him a sedative and a booster shot of de-sulph and decarb."

"Good." Bonnett turned to Garcia. "Stick by him until I call you."

"Righto." Garcia ducked back through the door.

Bonnett's in command, thought Ramsey. *We never thought of that. Can he adjust to the job?* And then another thought: *Good Lord! What if he's the sleeper?* He studied the first officer covertly out of the corners of his eyes.

The *Ram* sped onward.

"Depth five hundred and fifty fathoms," said Ramsey.

Bonnett shifted the *Ram's* driving planes, took them down to five hundred fathoms in a low glide. He brought the deck level when the pressure gauge read thirteen hundred pounds to the square inch.

"Twenty minutes," said Ramsey.

"Give or take a few," said Bonnett. "What's wrong with Joe? Why doesn't he let us know how the skipper is?"

"You didn't tell him to," said Ramsey.

"Yes, but—"

"There's most likely nothing to report. It's too soon."

"Get him on the intercom."

Ramsey shrugged, thumbed the switch on his chest mike: "Joe?"

"Here."

"How's the skipper?"

"Still sleeping. I'd give a pretty to know what the overdose actually was."

"Did you check his suit dosometer?"

"Right after he got out of the tunnel. Slight overage, just as Les

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said. You know, I'm no medical chap, but I'd swear that he'd gotten contaminated atmos."

"How?"

"I don't know, really. I saw him check suit pressure before going in. It was still holding when he came out. I'm certain there were no leaks."

"Did you snoop the tunnel filter system?"

"That's what I'm worried about, Johnny. I naturally assumed—"

Bonnett interrupted, speaking into his own microphone: "Can you leave the skipper?"

"Yes. He's resting quietly."

"Get forward and snoop that filter."

"I'm on my way."

Bonnett turned to Ramsey. "There's a lesson for you and I'm ashamed to say it of Joe: Never assume anything. You have to know!"

"Couldn't he assume that the tunnel's filter system was O. K.?"

"Well—"

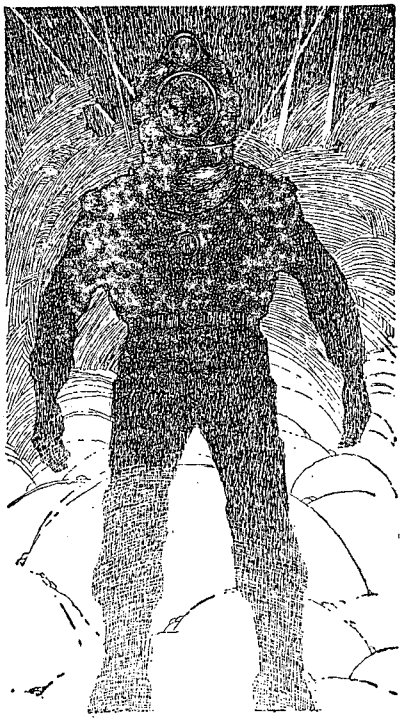
"We assume a lot of things about our little world."

"The perfect ecology," muttered Bonnett. "Self-sustaining."

Garcia slipped into the control room, went out the forward door without speaking.

"If that filter system is leaking," said Bonnett, "I'll—"

"Signal!" Ramsey slapped the cutoff switch, silencing the drive. The *Ram* drifted. "Quartering to the east." He narrowed down the tuning band. "Pack. There's more behind us!" He rotated the finder band. "More at three forty."



"Boxed!" said Bonnett. "Have they spotted us?"

"Can't be certain. No collision courses."

"What's the depth?"

"Reading now six hundred eighty fathoms. We're on the edge of the basin."

Bonnett engaged the drive, eased them forward at minimum speed. "Tell me the instant you detect a change of course from one of those signals."

"Aye."

Garcia's voice came over the intercom. "Les?"

"What is it?"

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"Filter's cool, but the inner hose line shows a slight leakage."

"How much?"

"Sixty m-r. I make it a thirty-eight minute overdose."

"Where's the leak?"

"Inside somewhere. Maybe that broken control arm slapped something. I can't tell from here."

"Dog the hatch and come up here. We're ranging an EP signal."

"Righto. I heard you slip the drive."

Bonnett turned to Ramsey. "Depth?"

"Something over seventy-two hundred feet. Shelving off rapidly. Les! That pack behind us has changed course." Ramsey worked over his dials. "They've closed the angle, but they're not headed for us."

"It could be a trick! We can't chance it." He fed more power to the drive. The *Ram* picked up speed.

"They're on us! They've altered course, increased speed."

Bonnett pushed the drive control to its limit. They felt the straining of the giant engines.

Garcia stepped into the control room, wiped a spot of grease from his hand, looked at the search scope. "Have we had it, chaps?"

Bonnett ignored him. "Depth?"

"A little short of fifteen hundred fathoms. I'd make it about ninety-one hundred feet." He reset a dial beside the search scope. "The pack to our east has changed course. They are now on collision heading."

"It was nice knowing you, gentlemen," said Garcia.

"We can't turn east or south," said Bonnett. "Bottom is two thousand feet below our limit."

"I'm getting an interference reading at eighty-four hundred feet," said Ramsey. "Seamount. Heading two hundred and fifteen degrees."

"It might just as well be eighty-four thousand feet," said Garcia. "That'd be something like thirty-six hundred pounds to the square inch, almost six hundred over our limit."

"They'll be in firing range within a half hour," said Ramsey. He glanced at Bonnett. "What happens to the pressure hull coefficient if we boost internal pressure beyond ten atmos?"

"We wouldn't be alive to enjoy it," said Garcia.

"Maybe," said Ramsey. He slipped his vampire gauge from its belt case, locked it onto his wrist, shot the needle into his vein. "How long would it take to draw everything but the oxy out of our atmos?"

"Pure oxy?" Garcia appeared startled.

"What's on your mind?" asked Bonnett.

Ramsey said, "Put the anhydrase generation on manual and balance it by sight." He nodded toward the gauge on his wrist.

"What do the medics say about that?" asked Garcia.

"Nothing certain," said Ramsey. "I've heard it argued both ways." He glanced at the scope in front of

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him. "I think it may be our only chance."

"Joe, take over here," said Bonnett. He stepped away from the controls as Garcia took hold of the helm.

"What're you going to do, Les?"

"Unhook the governor from the anhydrase generator system."

Garcia's head jerked around. "You're not paying serious attention to this punk's suggestion!"

Bonnett already was removing the cover plate from the atmosphere controls. "I am."

"That's suicide."

Bonnett looked to the scope in front of Ramsey. "We're already dead. What do we have to lose?"

He put the cover plate carefully on the deck, returned to the maze of wiring which had been revealed.

"It's those red primaries at the top," said Garcia.

"I know," said Bonnett. He reached in with cutter pliers, snipped the wires. "Do you think the skipper's all right?"

"This is no time to worry about that."

Bonnett nodded, adjusted a pump control. "Johnny, what's the helium reading?"

"Point four."

Bonnett took out his own vampire gauge, adjusted it on his wrist. "Joe, take us down. Heading two hundred and fifteen degrees. Johnny, how far to that seamount?"

"Six minutes."

Bonnett's head snapped up. "You been working time-over-distance in your head?"

Ramsey busied himself with the search controls as the *Ram*'s deck slanted downward. "Yes."

"We'll make a submariner out of him yet," said Garcia. He looked at Bonnett. "Are you sure it wouldn't be better to try floating up again?"

"They're too close," said Bonnett. "Besides, I'm afraid to take another chance on rolling. We sheared off the damper control base in there." He nodded toward the bow. "No telling what we did to the pile base."

Garcia wet his lips with his tongue.

"Won't they hear us go down?" asked Ramsey.

"They know our depth limit," said Bonnett.

"This was your idea," said Garcia. "Are you getting cold feet?"

Ramsey swallowed.

"Their metal detection is poor," said Bonnett. "I'm counting on their thinking we've taken the deep six rather than risk their fish."

"They won't hear any breaking up noises," said Garcia.

"We hope," said Ramsey.

Garcia paled.

Ramsey looked to the big static pressure gauge. "Outside pressure twenty-nine hundred pounds." He glanced at Bonnett. "Skipper."

"We have only one skipper," said Bonnett. "He's aft in sickbay."

"No, I'm not!"

They whirled. Sparrow stood in the aft doorway, hand on the metal

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rim, face pale and beaded with perspiration. "What is the situation, Les?"

Bonnett told him.

Sparrow turned a searching look on Ramsey. "This was your idea?"

Ramsey nodded. *How long was he standing there?* he wondered.

"What are your orders?" asked Bonnett.

"Carry on," said Sparrow. "You are in command."

Bonnett turned back to the pressure controls. "Helium below detection range," he said. "Shall we go sit in the mud, Joe?"

Garcia increased the dive angle.

"The medics say it's theoretically possible for the human body to take four hundred pounds under pure oxy and carbonic anhydrase conditions," said Ramsey.

"Do all of them say that?" asked Bonnett.

"No, only some of them."

"I can see it now," said Garcia. "An account of the reactions of four human bodies to four hundred atmospheric pressure in a Hell Diver Class Submarine, with technical commentary on the autopsies."

Ramsey shivered, looked at the red center dial on the static pressure gauge showing the *Ram*'s internal pressure: one hundred and ninety-seven pounds to the square inch. He glanced at the vampire gauge on his wrist, said, "CO_2 diffusion is now two sixty-six. We have fifty-four thousandths to go under present conditions."

Bonnett said, "I'll give us two hundred and fifty pounds internal as a starter." He opened a valve, increased the anhydrase pump setting.

"Two minutes to bottom," said Ramsey. "It's a long thin seamount, ridge running parallel with our course. About ten miles."

"Pressure is holding," said Bonnett. "How long until that pack ranges us?"

"Fifteen minutes."

Behind them, Sparrow said, "Now we're going to find out how well these Hell Divers are built."

"I'm more interested in how well I'm built," said Garcia.

"I'd say the good Lord did an excellent job, all things considered," said Bonnett.

Ramsey thought, *Now that was a strange remark from him. More what I'd have expected from Sparrow.*

"Lord, we beg your indulgence upon us," said Sparrow. "We who have no right to ask it. Amen."

"Flatten the glide angle," said Bonnett.

Garcia brought up the nose.

"Give us the nose eyes and two searchlights."

The main screen above them came alive, showing a path of light through green water. Pale phosphorescent shapes ranged beyond the limits of the light.

Ramsey looked at the internal pressure reading: 400 pounds even.

"Ease her down," said Bonnett.

The deck tipped.

Outside pressure passed through 3400 pounds . . . 3420 . . . 3440 . . .

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Ramsey found himself unable to tear his gaze away from the dial.

3500 . . . 3520 . . . 3540 . . .

"Diffusion is normal," said Bonnett. "Is anyone feeling ill effects?"

"I feel silly," said Garcia.

"Steady," said Bonnett.

"Be alert for oxygen intoxication," said Sparrow.

The pressure dial passed 3600 pounds . . . 3620 . . .

"Flatten the glide," said Bonnett.

Garcia complied.

"Depth?"

Ramsey forced himself to look at his instruments.

"Fifty feet."

"Down," said Bonnett.

Again the deck tipped.

Now, they watched the big screen below the pressure gauge.

"There!" said Garcia.

It seemed to come at them out of a green fog: a long pie cut of red ooze slashed from the darkness by the searchlights. A uniform ripple pattern stretched diagonally across the ooze which showed not a sign of sea life.

Garcia eased up the bow planes and the *Ram* grounded gently, stirring up a fog of the red ooze which clouded the screen.

"Kill the drive," said Bonnett.

Garcia's hand already was on the switch. The motors fell silent.

Ramsey whispered, "It's eight thousand four hundred and sixty feet."

"A new world's record," said Garcia.

Sparrow stepped forward onto the control deck. "Thank you, Lord," he said.

"I've come to a decision," said Ramsey. "I'm just a natural-born coward. Nothing ever came so easy to me in all my life."

"Is anybody feeling ill effects from the pressure?" asked Sparrow.

"I'm still feeling silly," said Garcia.

"Anybody else?"

Ramsey shook his head, studied the search instruments in front of him.

"Diffusion is point two fourteen," said Bonnett. "We're still getting rid of it faster than we take it in."

Ramsey said, "Great God in Heaven!"

"Where else would you expect him to be?" asked Garcia.

"There's a cold current moving in," said Ramsey. "Right over us."

"God spreads his cloak upon us," said Sparrow.

"Pack ranging over us to the south," said Ramsey. "Eight thousand yards."

Bonnett said, "Any indication that they smell us?"

"No."

"They won't look where they don't believe we can be," said Garcia. He grinned. "And that's not strange. I don't believe I'm here, either."

"I'm losing 'em through that cold layer," said Ramsey.

"Skipper an' God are buddies," said Garcia. "Good close buddies. Do

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favors for each other alla time." He staggered slightly.

Ramsey grabbed Garcia's wrist, looked at his vampire gauge. "Diffusion normal. What's—"

"Oxygen reactions vary," said Bonnett.

"What's wrong with you chaps?" Garcia's head wobbled. He peered at them owlishly.

"Take it easy, Joe," said Sparrow.

"Easy?" He squinted up at Sparrow. "I know you, skipper. You're King David all over again. I've heard you." He shook his head loosely, lifted his right hand. "In my distress I called upon the Lord, and cried to my God: and he did hear my voice out of his temple, and my cry did enter into his ears."

"All right, Joe. Let's go back and hit the sack." Sparrow took Garcia's elbow, urged him toward the aft door.

"Leggo me," said Garcia. He shook off Sparrow's hand, staggered, caught his balance, turned and stared deliberately at Ramsey. "I know all about you, Mr. Long John Ramsey. You look down your long nose at me! Think you know somethin' 'bout me. You don' know nothin'. Nothin'!"

"That will be quite enough, Mr. Garcia." Sparrow's voice had iron in it, a harsh note of command.

"Sorry, skipper." He turned toward the door. "Le's go. 'M tired."

Sparrow stared at Ramsey, then turned, urged Garcia out the door.

In the control room there was silence for a moment broken only by the faintest murmuring of standby machinery. Then Bonnett said, "Long John? How'd you get a nickname like that?"

Ramsey studied his instruments before turning toward Bonnett. *That damned nickname! It could mean only that Garcia knew about his past—his real past.*

Bonnett said, "I asked—"

"Yes, I heard you. A supply officer christened me. Said I was a worse pirate than the original Long John Silver. That's all."

"Pirate? Why?"

"For scrounging extra equipment. Moonlight requisition."

Bonnett smiled. "I don't see why that'd put Joe on his ear. Unless he's jealous of someone better at it than he is."

And Ramsey was thinking: *Garcia will tell the skipper. Sure as hell he will.*

"Is it extra hot in here?" asked Bonnett.

Ramsey looked at the beads of perspiration on Bonnett's face, glanced at his vampire gauge. Blood temperature normal. He looked at the dial of the thermo-system monitor on his board, said, "Seventy-one degrees."

"My skin feels itchy," said Bonnett.

Ramsey resisted the impulse to scratch at his own forearm, said, "I've been noticing the same thing."

Bonnett glanced at the exposed wiring of the atmosphere controls,

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checked a dial setting. "Anhydrase generation is double the normal. Gas volume twenty c.c.'s per cubic meter."

"We're off in the wild unknown," said Ramsey.

"We shouldn't be," said Bonnett. "We've had carbonic anhydrase for forty years."

Ramsey re-set a kick-out meter on his sono-board, looked up at the primary oscilloscope.

"Hear anything?"

Ramsey shook his head. "This C-A is funny stuff, Les. We've pushed chimpanzees to four hundred pounds with it for extended periods. Some lived. Some didn't. A few of the bright boys think they know why."

"Why?"

"Well, the theory is that C-A acts on a rather nebulous central nervous system unit called the 'metabolic governor' in such a way as to keep us from burning up when available oxygen is increased. They think sometimes the governor gets a little bit off—out of timing kind of—and the organism gets caught in a feedback situation: oscillates to death."

"Why?"

"That they don't know. Maybe the 'metabolic governor' gets tired."

"What're the chances one of us'll get caught that way?"

Ramsey shot a sharp glance at him, looked back at the search board. "That's a stupid question, Les."

Bonnett colored. His jaw set.

"If you're trying to get me to reassure you, no dice," said Ramsey. "All I know is we're still alive, even if we are a bit uncom— Signal!" He slapped the switch on the ranging computer, read the dial. "Five hundred yards. They're quartering southwest."

"Do we still have God's cold cloak over us?"

Ramsey caught a jibing cynicism in Bonnett's voice he had never noted before. He glanced at the thermocouple dial. "It's been over us periodically. Gone now. I think this seamount acts like a barrier to the Arctic current. Probably sets up complex whorl patterns here." He looked back to the ranging dials. "The EPs are holding course. They're drawing away now."

"Was there any doubt that they would?" asked Bonnett.

"What do you mean?"

"You've some things to learn yet about our skipper," said Bonnett. "Joe wasn't joking. There's an unca—"

The *Ram* gave an abrupt lurch and the deck tipped two degrees left.

Ramsey caught the rail in front of his board. "What the—"

"The tow," said Bonnett. "Current's playing with it."

"I felt it nudge us when we sat down," said Ramsey. "But the bumpers—"

They lurched another degree to the left.

"Just pray it doesn't drag us off this mountain," said Bonnett. "We couldn't take the extra two thousand feet."

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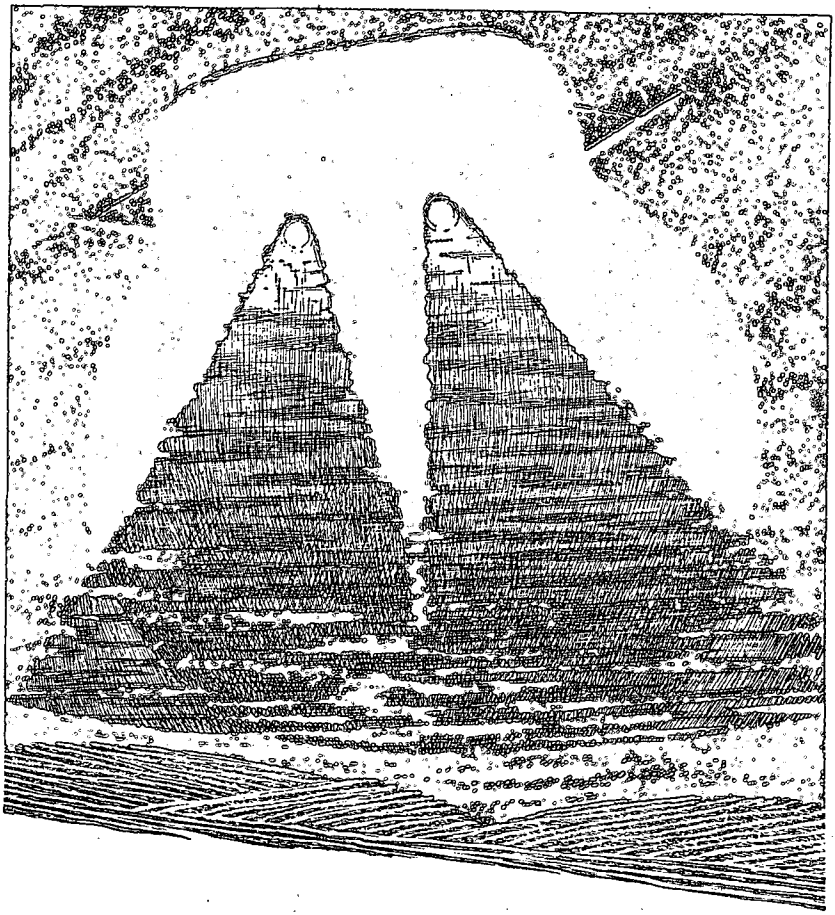

"How do you know?" asked Ramsey. He studied the search board.

"I feel the mountain under my feet all foggy."

Ramsey looked up. "What'd you say?"

"I feel all foggy in the head," said Bonnett. He leaned against the grabrail. "Fall off the mountain. Hate the fog." He forced himself upright. "Noth thinking straight. Take over, Mr. Ramsey. I'm . . . I'm—" He sat down on the deck, one hand above him still clinging to the rail.

An abrupt correlation interlocked in Ramsey's mind. He glanced one more time over his search board, turned away, forced himself to walk

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calmly across to Bonnett. He bent over the first officer, checked Bonnett's vampire gauge. CO_2 diffusion .228. Above normal by .016. He dropped Bonnett's wrist, stood up and made a minute micrometer reduction in anhydrase generation.

"What's wrong with Les?" Sparrow stood in the aft door, gaze sweeping over the control deck. He stepped through the door as Ramsey turned.

"Take it slow," said Ramsey.

"Wha—" Sparrow hesitated in mid-stride.

Ramsey bent over Bonnett, again checked his vampire gauge, compared it with the one on his own wrist. No change. Too soon. He said, "I've just formed the Ramsey Theory on why some chimpanzees died and some didn't."

Sparrow again moved forward, bent over Bonnett. "What chimpanzees?"

"The chimps Med-One put under four hundred pounds with peak anhydrase. My advice is for you not to overexert, get excited, nervous, or—"

"I know about the chimps," said Sparrow. "Do you think—" He hesitated.

"Some kind of glandular upset," said Ramsey. "What more likely than an emotional trigger, maybe coupled to physical activity?"

Sparrow nodded.

Ramsey noted the vampire gauge needles sinking toward normal. He began massaging Bonnett's left arm. "You're O. K., Les. Just relax and take it easy. The crisis is over. Take it easy . . . take it easy . . . take it easy—"

Bonnett's head rocked groggily.

"We have to avoid excitement," said Ramsey. "Our bodies are walking a tight wire down here. An uneasy balance."

Sparrow stood up, went to the search board. "I gave Joe a sedative. He was crying, raving. Maybe I—" He fell silent.

Bonnett opened his eyes.

"Remain calm," said Ramsey. "Do you hear me, Les?"

The first officer nodded.

"There's no danger if you relax."

"You can't force a man to relax," said Sparrow.

Ramsey reached around Bonnett's head, found the nerve line on the back of his neck, massaged it. "You're feeling better already."

Bonnett wet his lips with his tongue. "M O. K. Get back to your board."

"Breathe slow and easy," said Ramsey. He stood up.

Bonnett swallowed, spoke as though past a thickened tongue. "It was like quicksand. Feelin' better now."

Ramsey turned toward Sparrow. "He'll be O. K. now."

Sparrow glanced down at Bonnett. "Stay where you are, Les, until you feel like getting up." He turned to Ramsey. "I've been on the eyes. The current has pulled our tow to a forty-five degree angle across our stern. If we slack off the top tow

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line, we'll right but that might free the tow for a further shift."

"Best leave well enough alone," said Ramsey.

"How near the edge of this seamount are we? The eyes don't show it."

"Maybe seventy-five yards. For the tow, that is. We were angling away from the edge when we sat down."

Sparrow looked at the ranging computers. "Intermittent signal near extreme range."

"That cold layer is waving over us like a fan," said Ramsey.

Sparrow backed away from the board, looked around him, brought his attention back to Ramsey. There was something in the way he looked at Ramsey of the same attention he gave to his ship's instruments. "What's this 'Long John' business? Joe doesn't make sense."

Ramsey repeated what he had told Bonnett.

"Did the *Ram* benefit from this acquisitive propensity of yours?"

"Not this trip, skipper."

Sparrow glanced upward to the row of reactor room telltales. "Maybe next trip."

Bonnett spoke from his position on the deck. "We're gonna have a next trip, too. If we don't crack up like poor Hepp."

"We won't," said Sparrow.

Bonnett heaved himself to his feet. "I'm glad we have God's word on that."

Sparrow gave him a searching stare, said, "I am reassuming command, Les. The circumstances warrant it. I'm in no immediate danger from that radiation overage."

"Of course, skipper." There seemed a sigh of relief in Bonnett's voice.

Sparrow said, "I'm going back now and have another look at Joe. I'm leaving Johnny on the searchboard. All clear?"

"All clear, skipper."

Sparrow turned his angular form slowly, went out the aft door.

"He's an automaton," said Ramsey, addressing the empty air where Sparrow had stood.

"He's under more pressure than the submarine," said Bonnett. He took a deep breath. "Let's you pay attention to that board."

Ramsey frowned, returned his attention to his instruments.

Silence hung between them.

Presently, Bonnett said, "Thanks, Johnny. Maybe you saved my life."

Ramsey shrugged, remained silent.

"I heard what you told the skipper. It feels right. Come to think of it, maybe you saved all of our lives."

"Be mighty lonesome down here all alone," said Ramsey.

"You'd probably prefer three well-stacked blondes," said Bonnett. "Come to think of it, that'd get my vote, too."

"Another signal at outer range," said Ramsey. "Six subs in net-search spacing. They'll pass out of range in the southeast quadrant."

"They just ain't looking where nobody could possibly be," said Bonnett. "Can't say that I blame them.

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I still don't believe I'm here." He glanced up at the static pressure gauge, looked quickly away.

"No need for two of us here," said Ramsey.

"Nothing except the skipper's double-team orders."

"Stupid orders," said Ramsey.

"Take it easy, lad," said Bonnett. "You can't fight the Navy chain of command and you can't fight God." He shrugged. "And when the two are on the same team—"

"What makes you believe that nonsense?" asked Ramsey.

Bonnett froze. "I make jokes, boy. That's one thing. What you just said is another thing." He shook his head. "I've been sixteen missions with that Savvy Sparrow guy. Don't talk to me about nonsense. I know what I've seen."

And you know what you want to believe, thought Ramsey.

Somewhere a faint dripping caught his attention: condensation on the pipes. The *Ram* suddenly assumed a cold empty feeling around him. *We're not going to make it,* he thought. *A thousand alert enemy subs ranging across our track. It was crazy to send us out. A desperation move.*

The lights of his thermocouple monitor winked blindly on the instrument board.

God's cold cloak waving over us! Maybe that's the best thing to believe. Knowledge is the curse of our lives. We eat the apple and we learn just enough to make us afraid.

The *Ram* shuddered briefly as the current tugged at her tow. The deck tilted back toward level.

"If we raise a big mudpatch on the surface—stirring up the bottom like a mudpie—they'll spot it," said Bonnett. "They'll have a sky full of buzzards this close to their own shores."

"How'll they see it in the fog?" asked Ramsey. He felt a sudden lightening of his spirits.

"Fog topside? How can you tell?"

"Skipper arranged it with God," said Ramsey.

"You think you're joking," said Bonnett. He looked at Ramsey. "You do, don't you?"

Ramsey reset the ranging computer in front of him. "A man has to live with his ship—be a part of it," he said, speaking lightly. He felt the sudden undertow-pull of thought below the words. It was like stepping outside his body and watching it function. "This ship believes in God," he said.

The counter hands of the autolog swept around . . . around . . . around— The watches changed as the *Ram* snuggled into the mud of the seamount.

Eleven days, thirty-two minutes from departure—

Sparrow stood at the control board with Ramsey, sharing the last half of the electronics officer's watch. The sense of excess pressure outside their hull had become a thing accepted.

"How long since you've heard one of their packs?" asked Sparrow.

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"Over six hours."

"How's the tow?"

Ramsey checked the line telltales, switched on the stern eyes one by one. "Laying to starboard about thirty degrees. Towlines clear."

Sparrow tested the drive controls, switched on the motors. A humming sense of expectancy came over the subtug. Ramsey felt it tingle through his body, starting in his feet against the deck.

"Let's go get that oil," said Sparrow. He threw in the drive switch, threw it off. "Just to stir up the mud around us. Drop four waist torpedoes, Johnny. We'll need buoyancy."

"What about the tow? It's not carrying enough pressure to blow at this depth."

"We're going to jerk it off the bottom. Pay out line until we get a good run on."

Ramsey pushed down the flat black toggles which dropped the torpedoes from the waist belt.

The *Ram* bobbed upward. Sparrow again threw power into the drive. The subtug slanted upward, towline reeling out behind them.

"Snub it," said Sparrow.

Ramsey locked the magnetic brakes on the outside reels. The tug came almost to a full stop, motors straining. Slowly, they struggled ahead.

"Line stretching," said Ramsey. "That slug's in solid."

Sparrow shook his head. "How much more line?"

"Eight hundred feet more or less."

"Give us some more."

The *Ram* again angled upward. Sparrow circled left, came back to the right in a snake track, barely moving.

"Operational depth," said Ramsey. "Outside pressure 2994 pounds."

"Snub towlines and blow number one tank," said Sparrow.

Again Ramsey stopped the outside reels. His right hand went out to the red handle marked "high pressure air." He set it over number one, flicked on the safety toggle, started bleeding air into the number one tank.

"Give it everything," said Sparrow.

Ramsey turned the valve two revolutions.

Sparrow put full power into the drive. The *Ram*'s bow tipped up to almost ten degrees. By inches, they climbed, twisting soggily.

"She's off," said Ramsey.

"How's the slug's compensator system?"

Ramsey looked to the tow board. "Following the pressure curve."

"Blow the slug's bow and stern tanks," said Sparrow.

"She's not at—"

"Blow them anyway. Water pressure will hold the air until we reach operational depth. We're going to need all the help we can get and as soon as we can get it."

Ramsey's hands moved over the towboard carrying out his orders.

They inched upward. Ramsey stared at the red dials of the slug's pressure system. "Bow tank's beginning to bubble."

They could feel it in the deck: a

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return to normal climb gradient, speed picking up.

"Bow tank just blew," said Ramsey. "There goes the stern." He wiped perspiration from his forehead.

"That was the thing Les should have considered," said Sparrow. "Now we know we can get off. As long as we have external weight we can drop for the initial buoyancy."

"How do you know that Les didn't—"

"I know my shipmates," said Sparrow. "Learn something from this, Johnny, and you'll make a good submariner. Never head into anything with a sub unless you have already worked out a plan for coming out the other side."

Ramsey chose his words carefully. "What's your plan for making the *big* come-out on the other side—with the oil?"

"Not just one plan," said Sparrow. "I have plans for every contingency I can think of. And for some maybe I shouldn't have thought of."

"Like for instance?"

Sparrow turned and looked full at him. "Like for instance my crew going psychotic, one by one."

Ramsey's eyes widened. The words leaped out before he could stop them. "And what about yourself?"

Sparrow's eyes glittered. "That's one of the ones maybe I shouldn't have thought of," he said. He swung back to the controls.

He's like a piece of machinery, thought Ramsey. *Great God in Heaven, what went into making a man like that?*

Bonnett entered carrying a hypodermic, its needle covered by a sterile pad. "Time for your shot, skipper."

"In my left arm?" asked Sparrow.

"Well—"

"Don't I get to keep any dignity?" asked Sparrow.

Ramsey grinned.

"I swear you guys take a perverse delight in this," growled Sparrow.

"It's really too much for your arm," said Bonnett. He glanced up at the static pressure gauge. "Six thousand feet! What're we doing up here in the shallows?"

Sparrow chuckled. "O. K., take my mind off my troubles." He backed away from the board. "Take over here, Johnny."

Ramsey stepped into control position. Behind him, he heard Sparrow grunt. "Easy, Les!"

"Easy as I could, skipper. There. Have Joe check you on his watch. You seem to be coming along O. K."

"I should be. I've three nursemaids."

Sparrow moved up beside Ramsey. "Hold us on course 64 degrees 45 minutes."

Ramsey turned the helm, looked up at the sonoran chart. "That'll bring us around Nordkapp." He did some mental figuring, glanced at the shaftlog counter. "About twenty-six and a half hours."

Sparrow looked startled.

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"He's good with figures," said Bonnett.

"He's also too interested in where we're going to be and when," said Sparrow.

"That Security pap is for the birds," said Ramsey.

"I wish to remind you that we found a dead man aboard this vessel, that we've been sabotaged right and left, that—" He broke off, staring at Ramsey.

It was Bonnett's turn to look startled.

And now I'm in over my head, thought Ramsey. *My plan had better be right or I won't—come out the other side.*

Sparrow looked at the timelog. "Time for Les to go on watch now." He gestured for Bonnett to take the helm. "Put us on autopilot. Steady as she goes."

Ramsey went to the aft door, turned, found Sparrow staring at him. The captain turned deliberately away, moved closer to Bonnett. "Standby the searchboard as soon as we're on autopilot."

"Aye, skipper."

Ramsey went out the door, swung it almost closed behind him, stood there with his ear to the crack.

Bonnett said, "How's Joe?"

"He's all right. He'll stand his regular watch."

"What's with this Long John Ramsey? Skipper, could he be a phony?"

"No doubt of it," said Sparrow. "The only question in my mind is: What kind of a phony?"

"Could he be a—"

"He very definitely could be. Someone loaded us with spybeams and trapped that Security officer."

"But Ramsey wasn't aboard then."

"That's what bothers me. Unless there was something wrong with the Security man's timing. That would explain it."

"I'll watch him, skipper."

"You do that. I'm also alerting Joe."

Ramsey tiptoed away from the door. *Well, I did it,* he thought. *I'd better be right.* He shuddered, turned at the end of the companionway, dropped down to his cabin level. He paused in front of Garcia's cabin, looked at the blank metal of the door. Again the thought passed through his mind: *I'd better be right.*

He went into his cabin, closing the door softly behind him, locking it. Then he brought out the telemeter, unreeled the tapes.

There was response for the time in the tunnel, the pile repairs, but now Sparrow was under rigid control. The wave patterns on the tapes were like the path of a rubber ball bouncing between two walls.

I have to be able to crack that control at will, thought Ramsey. *He has to fail—just once. At the right time and at the right thing.*

And another part of his mind said: *That's a helluva way to make someone well.*

He fought down that thought. *It has to be. It's accepted practice. It works.*

Most of the time.

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Sparrow's advice came back to him: *"Never head into anything unless you have already worked out a plan for coming out the other side."*

Ramsey sat down on his bunk, reset the telemeter, sealed it, slid it back beneath his desk.

What if my plan doesn't work? What's my alternative for that contingency?

He lay back on his bunk, staring at the rivet pattern overhead. Around him, the muted throbbing and humming of the subtug took on a fantasy-life. As though it knew where it was going and how to get there.

Ramsey fell into a troubled sleep, awoke for his next watch to find his body soaked in perspiration, a disturbing half-memory of a dream—no, a nightmare—which he could not bring to consciousness.

The automatic timelog read twelve days, seven hours and five minutes from departure. Last half of Garcia's watch, first half of Bonnett's. The red dot on the sonoran chart stood well into the shore off Nordkapp: shallow water with the *Ram* creeping along the bottom in one hundred fathoms.

In the control room a brightly-lighted sweep of bulkhead, telltales flashing, heavy shadows on the undersides of levers and valve wheels. Wavering admonitions of dial needles. The two men bent over their work like laborers in a metal cave.

Bonnett looked up to the static pressure gauge: two hundred and sixty pounds to the square inch. "What's the skipper thinking of, coming in close like this?"

"Don't ask so many questions." Garcia made a minute adjustment in the bow planes, watched the depth repeater. "We're twenty feet from bottom."

Sparrow ducked through the door from the aft companionway. "Anything showing on the searchboard?" His voice was husky with a sense of fatigue. He coughed.

"Negative," said Bonnett.

"This is their water," said Sparrow. "They've no shore stations along the north coast; only along the Norway reaches."

"This is still awful close," said Bonnett. Again he looked to the depth gauge. "And awful shallow."

"You don't think this is a safe place for us?" asked Sparrow.

"No."

"Good. That means they don't either. They know this is a *deep* tug. They're out scouring the Norwegian Basin. The sill depth there is right on our known limit."

"So?"

"So we're going to shoot right across the shallows." He glanced at Garcia, then up to the sonoran chart. "Course seventy degrees, Joe."

Garcia swung the helm, watched the compass until they were heading true, then he, too, looked at the chart. "Novaya Zemlya," he whispered.

"We're shallow enough to start taking outside samples," said Sparrow. "Les, look for an isobaric sur-

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face running almost parallel with our course. We could use the shielding of some colder water."

Bonnett pulled down a density gradient chart for the area, checked the isobaric differences, ran a siphon sample of the exterior water. "Give us sixty-nine degrees for five minutes," he said.

Garcia touched the helm. They watched the thermocouple repeater. Suddenly, it dipped fifteen degrees. "Resume course," said Sparrow.

The *Ram* returned to seventy degrees, cruising under the sheltering mask of the cold current spilling down around them.

"Steady as she goes," said Sparrow. "Push search to limit. It's a straight run from here on in."

"It's Novaya Zemlya, isn't it?" asked Garcia.

Sparrow hesitated, then: "It's obvious anyway. Yes."

"That's an EP rocket testing base," said Bonnett. "It'll be bristling with buzzards and shoopers."

"We dug the well right under their noses," said Sparrow. "If we could dig without their hearing us, we ought to be able to drain it dry undetected."

"Are they tapping the reservoir, too?"

Sparrow grinned wolfishly, his long face glistening in the multihued lights of the control board. "That's the beauty of it. They don't even know it's there."

"Lordy," whispered Bonnett. "A fresh well. What're we looking for in the way of landmarks?"

Again Sparrow hesitated while his eyes sought out the red dot on the sonoran chart. *It wouldn't even be a secret from the EPs if they spotted us here,* he thought. *Now, we're in God's hands for sure.*

"We're looking for a narrow fault fissure," he said. "It's called the gut and it slants right up into the island shelf. You can't miss it once you range across it. Depth down to thirty-six hundred feet and only four hundred feet across."

"Fissure is right," said Garcia. "Do we go down into that thing?"

"No. It's our trail. We track it in." Again he looked at the chart. "Thirty-three hours at this rate." He turned to the aft door. "Call me if anything develops."

He was gone down the companionway.

"If anything develops," muttered Bonnett. "We're sitting ducks. The only development we'll get is a fish in our belly. That'll wake him!"

"I think he's right," said Garcia. "They're all out in the deeps looking for us. This is going to be a milk run."

"I'm curdled already," said Bonnett. He fell silent, watching the searchboard.

The *Ram* drove onward, headlong across the shallows like a frightened fish. The hands of the timelog swept around, around.

"Relieving Mr. Garcia on watch." Ramsey spoke as he ducked through the door into the control room. He could sense the immediate stiffening

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of the two men on the board, the mounting tension.

Garcia made an attempt at casual banter. "Look who's gone all Navy formal on us."

Ramsey took up his position beside Garcia. "What course?"

"Seventy degrees." Garcia surrendered the helm.

"Busting right across the shallows," said Ramsey. "If we make this, I'm going to burn a candle to St. Cuthbert."

"That's not good talk," said Bonnett.

"Have you heard what the EPs have done now?" asked Ramsey. "They've put engines in Novaya Zemlya. When we get close they're going to move it right out of our way, let us go lumbering off into Siberia."

"Clever chaps," said Garcia.

"Skipper's going to run us right into an EP trap net," said Ramsey. "We'll spend the rest of the war in a prison camp being brain-washed while they take the *Ram* apart bolt by—"

"Button your lip," said Garcia. "We're going to pull this one off. And when we set foot on that blessed dock I'm going to take pleasure in pushing your—"

"That will be enough!" said Bonnett. "This is no time for fighting among ourselves."

"You wouldn't say that if you knew all about this wise guy," said Garcia. "The superior brain: knows all, sees all, tells nothing!"

"Hit the sack, Joe," said Bonnett. "That's an order."

Garcia glowered at Ramsey, turned away, went out the aft door.

"What're you trying to prove, Johnny?"

"How do you mean?"

"Baiting Joe like that."

"He baits easy."

Bonnett stared at him. "One way to wreck a ship is to destroy crew morale," he said. "There will be no more such actions from you on this cruise."

"You sound like one of the old ladies of Security," said Ramsey.

Bonnett's face darkened. "Knock it off, Mr. Ramsey. This won't work with me."

It's already working, thought Ramsey. He said, "This is going to be a really gay bunch when we get to Novaya Zemlya. All of us looking over each other's shoulders."

"How do you know where we're

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headed?" gritted Bonnett. "You weren't here when the skipper announced our destination."

"I read tea leaves." Ramsey nodded toward the depth gauge graph tape. "Are we looking for that?"

Bonnett snapped his attention back to the tape. A sharp line broke off the tape, came back on after a brief interval.

"That's a *development,*" said Bonnett. "Buzz the skipper."

Ramsey depressed the black toggle of the number-one call button. "Shall I hold course?"

"No. Quarter back on—Signal!" He slapped the button for the range computer sheet down the drive. "Eighteen miles. Intercept course."

Ramsey whirled the helm to the right. "Have they heard us?"

"There's no telling," said Bonnett. They coasted silently while he watched the pips on his screen.

Sparrow entered the control room. "Signal?"

"Heading two hundred and seventy degrees," said Bonnett.

"What's the depth here?"

"Four hundred feet, give or take a few."

"You're forgetting something," said Ramsey. He pointed to the tape record of the deep fissure.

"Hide in that thing?" Bonnett's voice rose half an octave. "We couldn't maneuver. Straight down the alley and they'd have us bottled up."

The *Ram*'s deck began to tip to the left as they lost way.

"Give us headway," ordered Sparrow.

Ramsey eased in the drive. He watched the pulse-reader showing bottom depth below them. Abruptly, it fell off beyond the meter setting. Without being told, Ramsey brought the helm up to left until they were over the fissure.

"Down into it," said Sparrow.

"What if it narrows down to nothing?" asked Bonnett. "We couldn't back out without fouling our towlines. We'll be—"

"Watch your board," ordered Sparrow.

The oscillations on the screen damped down, then blanked out.

"Full speed," said Sparrow. "Down farther, Johnny!"

Ramsey felt the excitement gripping his stomach. "The walls of this fissure are hiding our sound!"

"If we hit something, we've had it," said Bonnett.

Sparrow glanced at the big static pressure gauge: 1240 pounds. "Give us a pulse sweep on those walls—fifth-second intervals."

"Whatta you think I'm doing?" muttered Bonnett.

Sparrow grinned. He put a hand on Ramsey's shoulder. "Ease her up."

"Speed?"

"No, depth. Set us level."

Ramsey brought up the bow planes. The *Ram*'s deck came up to level.

"One degree right," said Bonnett.

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Ramsey swung the helm.

"We're doing twenty-two knots," said Sparrow. "If we can just put—"

"Two degrees right," said Bonnett.

"Coax a little more speed out of her," said Sparrow.

Ramsey fined down the setting on the magnometer for the induction drive.

"Open the silencers," said Sparrow.

"But—"

Sparrow's fingers dug into Ramsey's shoulder. "Do it!"

Ramsey's hand went out, jerked down the big red handle above the helm. They could feel the added surge of power.

"Twenty-eight knots with that tow behind us," said Sparrow. "There's life in the old girl yet."

"Two degrees left," said Bonnett.

Ramsey complied.

"An EP subcruiser can do forty-five knots," said Bonnett. "Are you trying to run away from them?"

"How fast were they closing us at our last known position?" asked Sparrow.

"Estimated search speed of twenty knots," said Bonnett. "Say forty-five or fifty minutes unless they were on us and upped speed when we went out of sound. Then maybe only a half hour."

Sparrow looked at the timelog. "We'll count on a half hour." He waited silently.

"Two degrees left," said Bonnett.

Ramsey brought the helm over, straightened them out on the new course.

"She's narrowing down," said Bonnett. "No more than three hundred feet wide here." He reset the ranging computer. "Now it's down to two hundred and fifty. Here's—Two degrees left!"

Ramsey swung the helm.

"We're all right if we don't scrape the slug off on the walls of this hole," said Sparrow.

"Three degrees right."

Ramsey obeyed.

"Two hundred feet," said Bonnett. "Minus . . . minus . . . 185 . . . 200 . . . 215— Two degrees right."

The *Ram* tipped to the rudder response.

"Give us the silencer planes," said Sparrow.

Ramsey pushed up the big red handle. They could feel the drag.

"Half speed," said Sparrow. "How far to the canyon rim?"

"I can only guess," said Bonnett. "Too sharp an angle to get a difference reading."

"Well, guess then."

"Eighteen hundred feet."

"Hear anything behind us?"

"Negative."

"Motors off," said Sparrow.

Ramsey silenced the drive.

"Now, do you hear anything?"

Bonnett fussed with his instruments. "Negative."

"Full speed," said Sparrow. "Two degrees on the bow planes."

"Two degrees on the bow planes," acknowledged Ramsey. He brought

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up the planes, eased in the drive, sent them surging upward.

"One degree left," said Bonnett.

Ramsey swung the helm.

Sparrow looked at the pressure reading: 860 pounds. They were above 2000 feet. Still the *Ram* coursed upward.

"Half speed," said Sparrow.

Ramsey brought back the throttle control to the mid-notch.

"I can give you a rim reading," said Bonnett. "About ninety fathoms."

"Five hundred and forty feet," translated Sparrow. "Are you sure of that silt depth?"

Bonnett rechecked his instruments. "Reasonably sure. I can give you a better reading in a minute."

Again Sparrow looked to the pressure gauge: 600 pounds.

"Make it eighty fathoms," said Bonnett. "I was getting angular distortion."

"Four hundred and eighty feet," said Sparrow. "Less than a thousand to go. Quarter speed, if you please."

Again Ramsey brought the throttle bar back a full notch.

"Hear anything, Les?"

"Negative."

The pressure gauge climbed past 400 pounds to the square inch: above 1000-foot depth.

"I make that canyon rim in four hundred and sixty feet of water," said Bonnett.

"Anything on the phones yet?"

"Still quiet."

"Give us full power until we reach maximum speed," said Sparrow. "Then shut everything down and coast up onto the rim. Set us down as gently as you can."

Ramsey's eyes widened.

"Now," said Sparrow.

Ramsey shot the throttle forward. The subtug leaped ahead. They watched the pitlog. It went through twenty-three knots.

"Now!" barked Sparrow.

Ramsey killed the drive, freed the induction system to allow the propellor to spin free. He jockeyed the planes to keep them on an even keel with the least drag.

"We're over," said Bonnett.

Ramsey watched the pitlog, began counting off the time-over-distance until he was certain the tow had cleared. Then he brought the bow planes down.

They grounded in mud with almost no headway.

"I'm hearing them, skipper," said Bonnett. "About ten miles behind us and to the—"

"What's wrong?"

"Lost 'em."

"They've gone into the gut after us," said Ramsey.

"Lift us," said Sparrow. "Force speed!"

Ramsey jerked into motion, fed power into the drive, eased them off the bottom, pushed the throttle to the final notch.

Sparrow watched the timelog. Five minutes. "Kill the drive."

"Still silent," said Bonnett.

"Five minutes more," said Sparrow.

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Ramsey again sent them shooting ahead. Five minutes. Drift and listen. Five minutes. Drift and listen. Five minutes. Drift and listen.

"Set us into the mud again, Johnny."

The *Ram* slanted down, grounded on a ripple surface of black manganese pebbles.

"We've come eight miles from the gut," said Bonnett. He looked at the pressure gauge: 300 pounds. "It's only seven hundred feet deep here."

"What do we care?" asked Ramsey. "They think we're in that slot. They'll be scraping the bottom of it."

Sparrow said, "And there goes the whole shooting match."

Ramsey looked at him sharply. "What do you mean?"

"They spotted us too close to target. And right on the trail leading to the well."

"How do they know it wasn't a feint?"

"No. They know we were hiding. They know—" He fell silent.

"You mean we're going to slink home empty handed?" It was Bonnett, voice bitter.

"I wouldn't give them the satisfaction." The voice came from the aft door: Garcia.

The three in the control room whirled.

Garcia stepped fully onto the control deck. "We've *got* to thumb our noses at them, skipper."

"How long've you been there?" asked Sparrow.

Garcia frowned. "Maybe ten minutes. I heard the shifts in speed and felt—" He broke off. "Skipper, we've come too far to—"

"Relax," said Sparrow. "We're going through."

"How?"

"We're going to sit here."

"How long?" asked Ramsey.

"Maybe a day; maybe longer. Until they get tired of looking or decide they've missed us."

"But they're sure to leave a stakeout around here on just that chance," protested Bonnett.

"Let's just pray that they do," said Sparrow. "Les, take over the controls and standby on search. Johnny, you and Joe come with me."

Sparrow led the way across to the chart board. He swept his earlier work aside, pulled out a fresh sheet of scratch paper, began drawing cyclic curves across it. He took a second sheet, repeated the performance.

Ramsey watched, puzzled. Garcia bent close to the work.

Presently, Sparrow straightened. "What do I have here, Johnny?"

"It could be a sonic curve, but—"

"It's the modulated sonor beat of one of our A-2 fish," said Garcia.

Sparrow nodded. "Now watch this." He lifted one of the sheets, placed it over the other, held both to a light and adjusted them. He clipped the sheets together and, still holding them up to the light, began to draw a new free hand curve, a broken scrawl on the surface. "That's

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rough," he said, "but it gives the idea."

"A silencer-damped screw beat from the *Ram,*" said Ramsey.

"Two of our A-2 fish hooked in tandem and their screws set to resonate," said Sparrow.

"It might fool an EP until he got close enough to detect the difference in mass," said Ramsey.

Sparrow nodded. "And what if our pair of fish carried a scrambler set to go off before they could detect mass difference?"

Ramsey stepped back from the board, stared at Sparrow.

"These are shallow waters," he said. "The EPs would blanket the distortion area and flood it with seeker fish and—"

"And they'd get a very satisfactory explosion," said Sparrow.

"This is all very well, but how're we going to rig our fish out there when we're in seven hundred feet of water and unable to start our engines?" asked Garcia.

"We've a perfect stabilizer," said Sparrow. "The slug. We bleed air into our tanks until we gain enough buoyance to lift; then we pay out towline until we reach three hundred feet where we can go outside and do our work. The slug anchors us."

"Balance on the four points of the towlines," muttered Garcia. "It'll bloody well work. It will." He looked up at Sparrow. "Skipper, you're a genius."

"Can you two rig those fish to fake the sound of our screw?" asked Sparrow.

Ramsey grinned. "Just let us out there."

"One more thing," said Sparrow. "I'll want you to alter the speed controls like this—" Again, he bent over the chart board, scribbling on the scratch pad.

Ramsey shook his head. "Just a minute, skipper."

Sparrow stopped, looked up at Ramsey.

The electronics officer took the pencil from Sparrow's hand. "To the devil with the speed only—too complicated. What you want is a sound variation: first the sound of a Hell Diver subtug under quarter speed, then half speed and then full speed to simulate flight." He sketched in a series of matched harmonics. "We'll just change the resonating factor and—"

"The adjustments to change resonance won't give it much increase in speed," said Garcia.

"It'll be enough," said Sparrow. "They won't be looking for refinements. Johnny's plan is simpler, less likely to break down." He put a hand on the sketch pad. "Can you two do it?"

Garcia nodded. "Get us up there."

Sparrow turned back to the control board, strode across to Bonnett. "You hear that, Les?"

"Enough to get the idea." He tilted his head toward the search-board. "Still no sound of those boys."

"Let's hope they run right up onto

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Novaya Zemlya," said Sparrow. "Give us a half a per cent buoyance in the bow tank."

Bonnett stepped to his left, turned a valve wheel a fraction of a degree, watched a dial above it, closed the valve.

"Joe, play us up on the towlines," said Sparrow.

Garcia moved to the tow controls, released the magnetic clutch on the big master reel. Slowly, almost imperceptibly, the *Ram* lifted off the bottom, slid upward.

They watched the static pressure gauge climb through 200 pounds to the square inch, 180 . . . 160 . . . 140—

"Slow us down," ordered Sparrow.

Garcia fed a little power into the magnetic brakes.

. . . 130 . . . 120 . . . 115—

"Snub us," ordered Sparrow.

The needle stopped on 110 pounds.

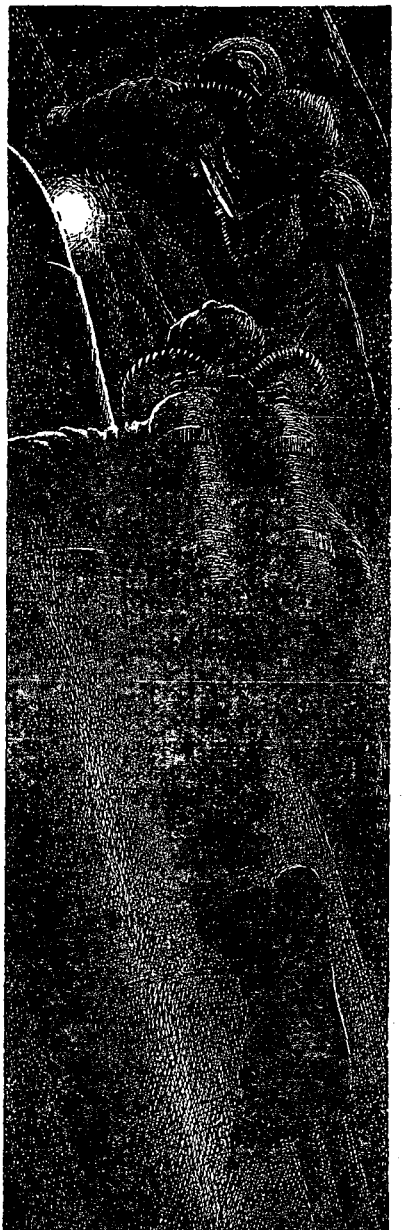
"That's close enough to two hundred and fifty feet," said Sparrow. "Joe, Johnny, this is your show."

Garcia secured the towboard. "Better watch the balance on these lines," he said. "If the current shifts—"

"That's our worry," said Sparrow. "I'd blow tanks before I'd pull you two down into high pressure."

Garcia smiled wanly. "Sorry, skipper. You know how I feel about—"

"You've a good electronics man with you," said Sparrow. He nodded toward Ramsey, looked significantly at Garcia.



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"I'm with you, skipper," said Garcia.

Ramsey thought, *Why doesn't he just say "Keep an eye on this suspicious character?"* He looked at Garcia. "You afraid of the water?"

Garcia's dark features paled.

"That will be enough," said Sparrow. "You've a job to do."

Ramsey shrugged. "Let's go swimming," he said, turned toward the forward door and led the way out onto the engineroom catwalk, up the ladder to the escape hatch, inside and back against the far wall while Garcia sealed the inner door.

Silently, they broke out aqualungs, sea suits, donned them.

Garcia checked his mouthpiece, pulled it aside. "Some day, somewhere, you're going to meet someone who'll thump your head for you," he said.

"Thump my head?"

"Yeah, head-thumper."

Ramsey stared at the engineering officer. "What do—"

"You psych boys are all alike," said Garcia. "You think you're the custodians of deep, dark knowledge. Sole custodians, I might add."

"I don't—"

"Stow it," said Garcia. "We've a job to do."

"But I thought you—"

"Yes, old fellow?" Garcia grinned at him.

"Well, I—"

"You thought I had you pegged for a spy, a jolly old sleeper," said Garcia. He shook his head. "None such. I'm quite certain you're not." He jammed his mouthpiece into place, cracked the valve letting in the outside water.

The cold sea rushed in around them and Ramsey thought, *How could he be certain I'm not the sleeper?* And then a thought as chill as the water in which he floated: *Unless he's the spy!* He turned fearful eyes on Garcia, who was a green shadow in the faint guide light of the escape compartment.

The green shadow swept upward toward the outside hatch, paused there, and the big circle of the hatch swung out. Garcia beckoned for Ramsey to follow.

A kick of fin flippers took Ramsey to the open hatch. Outside was blackness broken only by the glow from the escape compartment and the small handlamp carried by Garcia. The long Arctic night on the surface and the cover of water conspired to create an utter absence of light. In spite of the reflecting layers of his sea suit, Ramsey could feel the chill of the water begin to bite into him.

Garcia held to the hatch guard with one hand as he rigged a safety line onto his belt. The handlamp clipped to his wrist pointed down toward the waist rack of torpedoes: thin deadly shapes stuck through the metal guide slots like bullets in a belt.

Ramsey fastened his own belt clip to the safety line.

Garcia pointed his handlamp back into the hatchway, indicated another

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line snaking out of the green gloom of the escape compartment. Ramsey pulled on the line, brought out a tool kit.

A current caught at Ramsey, pulled him away from the hatch. He was snubbed short by the safety line, swam back and caught up the kit.

Garcia kicked off from the hull, swam down toward the torpedo rack. Ramsey turned for one look upward toward the night-cloaked surface, followed. The engineering officer stopped at a torpedo low down on the rack, keeping well clear of the finned arming rotor on the torpedo's nose. Yellow stripes behind the arming rotor identified it as a short-range, low-blast model for in-fighting.

Row on row of the deadly metal fish extended upward around the *Ram*'s waist.

Garcia patted the torpedo, looked at Ramsey.

Ramsey shook his head, pointed to one below it: red stripes—a long-range seeker.

Garcia nodded.

They dropped down to the torpedo, cautiously disarmed it. Ramsey noted the number: fourteen, pointed to it. Garcia nodded.

Ramsey unhinged the side plate, motioned for the light. Its beam shone into the torpedo. He had already figured out the changes necessary: disconnect seeker circuit, reset for level course; drive-timer coupling racked back to new control order—400 revolutions, 600 . . . 800. He forgot to worry about Garcia in the concentration of work.

Presently, it was done. They dropped down to another torpedo of the same model, repeated the changes—except for the calculated resonance factor. Then it was time to disconnect the upper torpedo, lower it down beside the second, link the two carefully with swivel bolts.

Below the altered torpedoes, Ramsey sought out the solid yellow and red nose of a scrambler model, inserted the seeker capsule from the first unit they had changed. He tied this torpedo to the other two with a length of light cable.

Toward the last he found himself working in less and less light. He seated the final cable clamp, looked up the hull.

Garcia floated high along the rack; now he was swimming toward the escape compartment. Swimming fast. The sea's darkness swept down around Ramsey.

Is he going to trap me out here? Close the hatch against me?

Panic washed over him. He flailed the fin flippers, swept up toward the receding light.

Garcia could wait in the compartment until he was almost out of air, knowing I'd be in the same fix. Then he could go inside to safety. I'd drown before they could come back out. He'd have a plausible story about me disappearing.

Garcia's light sank into the escape compartment, leaving the darkness behind.

I'm not going to make it!

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The safety line abruptly snubbed him up short. Ramsey tugged at it. Fouled on something! He fought the belt connection, freed it, resumed his flailing progress toward the hatch, a faint glow from Garcia's light against the blackness.

Now, he was over the hatch. Ramsey grabbed the rail, felt a hand take his, pull him inside. Garcia! Ramsey felt a wave of relief. The light in the compartment showed that Garcia had been reeling in the safety line. It stretched taut between reel and hatch. The snag. Garcia pointed toward the hatch.

He wants me to go out and free it, thought Ramsey. He shook his head.

Again Garcia pointed toward the hatch.

Again Ramsey shook his head.

Garcia hesitated, then swung up the line and out the hatch, taking the portable light with him. Presently, he returned and the line sagged. He reeled it onto its drum, sealed the outside hatch.

Ramsey opened the high-pressure air valve. The water level began to lower.

When it reached their shoulders, they unhooked the face connections of the aqualungs. Garcia's mouth held a subtle hint of amusement.

He knows he frightened me, thought Ramsey. *He did it deliberately.*

The last of the water swished out the seacock. Garcia undogged the inner hatch, led the way out onto the upper catwalk of the engine room. Silently, they stripped the suits from their bodies, returned to the control deck.

Sparrow met them at the door. "Well?"

"All done," said Garcia. "Fourteen is linked to twenty-two. They'll both fire on twenty-two's stud. They'll seek a northerly course and hold about ten fathoms off bottom."

Sparrow looked at Ramsey, who nodded. The skipper turned back to Garcia. "Run into any trouble?"

"Johnny's the electronics man. He did all the work."

Sparrow turned to Ramsey.

"It was fairly easy."

Garcia said, "Johnny's safety line snagged on the way in, but I freed it. Outside of that, it was a quiet swim."

"All quiet in here, too," said Sparrow. He nodded toward a cot on the far side of the control room, Bonnett stretched out on it. "Les is getting some shuteye. You two had better do the same. We're going to sit here for a while."

"Righto," said Garcia. "The swim made me tired. Let's go, Johnny boy." He ducked through the door, went down the companionway, Ramsey following.

Garcia stopped at the door of his room, turned and smiled at Ramsey. "Pleasant dreams—head thumper."

Ramsey brushed past him into his own room, locked the door behind him and leaned against it. He could feel his heart thumping heavily.

He fought himself into a semblance of calmness, went to the tele-

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metering box, examined the new lengths of tape.

Sparrow was still locked in icy control.

Ramsey reset the box, turned off his lights, fell into his bunk and into a restless sleep. It seemed that he had just closed his eyes when he was aroused by the buzzer. He got up stiffly, went forward to the control deck. The others already were there.

"Take over the searchboard," said Sparrow. He waited for Ramsey to comply, depressed the firing board stud at number twenty-two.

Immediately, Ramsey picked up the beat of it on his instruments. He felt Sparrow move into position beside him. Together, they stared at the scope.

"Good job," said Sparrow. "Looks just like our pip."

Ramsey rotated the outside bell-detector of the ranging system. "No sign of a stake-out," he said.

"That would be a bitter one," said Garcia. "All of our yeoman efforts out there gone for naught. I'd almost ra—"

"There he is," said Ramsey. "Northeast and coming fast."

"Interception course," said Sparrow.

"And there's the first speed increase in our decoy," said Ramsey.

"Couldn't have been better timing," said Bonnett.

"Another signal to the west," said Ramsey. "Our stake-out has called his pals."

"And there's full-speed simulation," said Sparrow. "Wonderful job, Johnny!"

They waited, watching the signals merge. Abruptly, the instruments gyrated wildly as the decoy's scrambler system was activated.

Again they waited.

A distant double thump resonated against the *Ram*'s hull and simultaneously, the scrambler signal stopped.

"Now track every one of them," said Sparrow. "If those EPs all leave, we've made it."

Ramsey watched the signals. "Pack quartering over the explosion area. Four departing." He waited. "Two more. Courses southwest. There go the last ones."

He tracked them until they went off his instruments, turned with a triumphant smile and looked at Sparrow. "Just as you planned it, skipper."

"Um-m-m, yes." He turned away. "We'll wait here another four hours before going on into the well area."

The *Ram* crept up the fissure at quarter speed, lifted out in six hundred feet of water and slid upslope like a giant fish seeking its dinner in the bottom mud. Inside, Sparrow stood at the helm, Garcia with him.

"There's the ledge," said Sparrow. He nodded toward the screen above them. It showed a pie-slice of illumination cut from the dark waters by the bow lights, a rocky outcropping.

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"Shall I call the others?" asked Garcia.

"Yes."

Garcia pressed the call button. Ramsey acknowledged from the electronics shack.

"What are you doing in the electronics shack?" asked Sparrow.

"I couldn't rest, so I—I had an idea about—"

"Just a moment." Sparrow pointed to the screen above him, a starfish-shaped mound. "Right on, Joe." He disengaged the drive, drifted up on the mound, past it, grounded.

"Two hundred and five pounds even, skipper."

Sparrow nodded, plugged in the side-eyes, examined the bottom. "Plenty of mud for ballast."

Bonnett entered. "Skipper, are we—"

"We've arrived," said Sparrow. "Les, will you go aft to the shack and check on Johnny?"

"Isn't he—"

"He's been in the shack for some time—alone!"

Bonnett whirled around, disappeared down the companionway.

"I will not be responsible for revealing the site of this well," said Sparrow.

"What do you mean?" asked Garcia. "You don't think I—"

Sparrow froze him with a look. "Mr. Garcia, we've been shipmates since you were a chief machinist and I was a dryback ensign; but right now I wouldn't trust *you* as far as I could see you. And I trust that Ramsey even less. Do I make myself clear?"

"Yes, sir." Garcia turned back to the searchboard.

In the electronics shack, Ramsey held up the tube on which he had been working. *This has to be how they set off their spybeam,* he thought. *And it means they could have another one ready to go any second.*

His hand trembled as he reached out to plug the tube into a test socket. The hand was abruptly knocked aside and a fist crashed into his jaw.

"You dirty rotten spy!" growled Bonnett. Again his fist crashed into Ramsey's jaw.

Ramsey—bent backward over the bench—tried to dodge aside. "Les, wait! I—"

My God! He means to kill me! thought Ramsey. He fought back desperately, chopping an arm at Bonnett's throat.

Bonnett dodged Ramsey's blow, sent another fist into the electronics' officer's mouth.

Bonnett stepped back, chopped the side of his hand into the curve of Ramsey's neck, sent a fist crashing into Ramsey's jaw.

Ramsey felt himself going blank; waved his arms futilely in front of him. Something crashed against the side of his head. He felt a sledge-hammer blow over his heart and blacked out.

TO BE CONCLUDED

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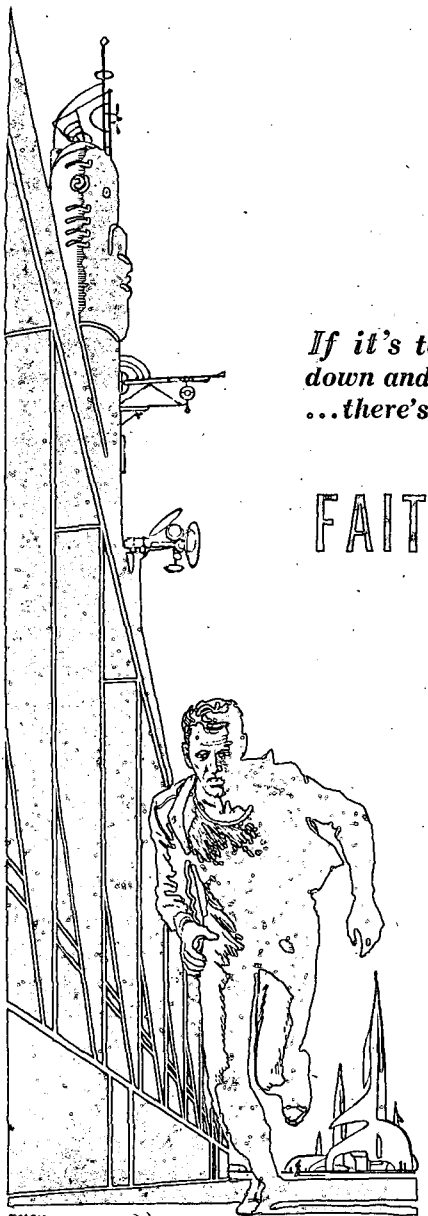

If it's too impossibly difficult to track down and recapture an escaped criminal ...there's a worse thing one might do....

FAITHFULLY YOURS

BY LOU TABAKOW

Illustrated by Emsh

JULY 18, 1949 A.D.

The fugitive lay face down in the fetid undergrowth, drawing in spasmodic lungfuls of air through cracked and swollen lips. Long before, his blue workshirt had been ripped to ribbons and his exposed chest showed a spiderwork of scratches, where branches and brambles had sought to restrain him in his frenzied flight. Across his back from shoulder to shoulder ran a deeper cut around which the caked blood attested to the needle-sharp viciousness of a thorn bush a mile to the north. With each tortured breath he winced, as drops

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of sweat ran down, following the spiderwork network and burning like acid. Incessantly he rubbed his bruised torso with mud-caked palms to dislodge the gnats and mosquitoes that clung to him, gorging shamelessly.

To the east he could see the lights of Fort Mudge where the railroad cut through on its way to Jacksonville. He had planned to ride the freight into Jacksonville but by now they were stopping every train and searching along every foot of the railroad right of way. In the distance he heard the eerie keen of a train whistle, and visualized the scene as it was flagged down and searched from engine to caboose.

Directly before him loomed the forbidding northern boundary of the Okefenokee Swamp. Unconsciously he strained his ears, then shuddered at the night noises that issued from the noisome wilderness. A frenzied threshing, then a splash, then . . . silence. What drama of life and death was being played out in that strange other-world of perpetual shadows?

In sudden panic he jerked erect and cupped his palm round his ear. Far off; muted by distance, but still unmistakable; he heard the baying of bloodhounds. Then this was the end. A sob broke from his throat. What was he, an animal; to be hunted down as a sport? Tears of self-pity welled to his eyes as he thought back to a party and a girl and laughter and cleanliness and the scent of magnolias, like a heady wine. But that was so long ago—so long ago—and now . . . He looked down at his sweating, lacerated body; his blistered calloused palms; the black broken nails; the cheap workshoes with hemp laces; the shapeless gray cotton trousers, now wet to the knees.

He pulled back his shoulders and resolutely faced west toward the river, but stopped short in horror as he heard the sudden cacophony of barks, yelps and howls of a pack of bloodhounds that senses the beginning of the end. He turned in panic. They couldn't be over half a mile away. In a panic of indecision he turned first east then west, then facing due south he hesitated a moment to take one last look at the clear open skies, and with a muffled prayer plunged into the brooding depths of the Okefenokee.

JUNE 13, 427th Year GALACTIC ERA

The building still hummed and vibrated with the dying echoes of the alarm siren as the biophysicist hurried down the corridor, and without breaking stride, pushed open the door to the Director's office.

The Director shuffled the papers before him and sighed heavily. His chair creaked protestingly as he shifted his bulk and looked up.

"Well?"

"He got away clean," said the biophysicist.

"Any fix on the direction?"

"None at all, sir. And he's got at least a two hours' start. That takes in a pretty big area of space."

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"Hm-m-m! Well there's just a bare chance. That experimental cruiser is the fastest thing in space and it's equipped with the latest ethero-radar. If we get started right away, we just might—"

"That's just it," interrupted the biophysicist. "That's the ship he got away in."

The Director jumped angrily to his feet. "How did that happen? How can I explain to the board?"

"I'm sorry, sir. He was just too—"

"*You're* sorry?" He slumped back in his chair and drummed the desk top with his fingernails, worrying his lower lip with his teeth. He exhaled loudly and leaned forward. "Well, only one thing to do. You know the orders."

The biophysicist squirmed uncomfortably. "Couldn't we send a squadron of ships out to search and—"

"And what?" asked the Director, sarcastically. "You don't think I'd risk a billion credits worth of equipment on a wild-goose chase like that, do you? We could use up a year's appropriation of fuel and manpower and still be unable to adequately search a sector one-tenth that size. If he just sat still, a thousand ships couldn't find him in a thousand years, searching at finite speeds. Add to that the fact that the target is moving at ultra-light speed and the odds against locating him is multiplied by a billion."

"I know, but he can't stay in space. He'll have to land somewhere, sometime."

"True enough—but where and when?"

"Couldn't we alert all the nearby planets?"

"You know better than that. He could be halfway across the galaxy before an ethero-gram reached the nearest planet."

"Suppose we sent scout ships to the nearer planets and asked them to inform their neighbors in the same way. We'd soon have an expanding circle that he *couldn't* slip through."

The Director smiled wryly. "Maybe. But who's going to pay for all this. By the time the circle was a thousand light-years in diameter there would be ten thousand ships and a million clerks working on recapturing one escaped prisoner. Another thing; I don't know offhand what he's been sentenced for, but I'll wager there are ten thousand planets on which his crime would not be a crime. Do you think we could ever extradite him from such a planet? And even if by some incredible stroke of fortune one of our agents happened to land on the right planet, in which city would he begin his search. Or suppose our quarry lands only on uninhabited planets? We can't very well alert the whole galaxy in the search for just one man."

"I know, but—"

"But what?" interrupted the Director. "Any other suggestions?"

"N . . . no—"

"All right, he asked for it. You have the pattern, I presume. *Feed it to Fido!*"

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"Yes, sir, but well . . . I just don't—"

"Do you think *I* like it?" asked the Director, fiercely.

In the silence that followed, they looked at each other, guiltily.

"There's nothing else we can do," said the Director. "The orders are explicit. *No one escapes from Hades!*"

"I know," replied the biophysicist. "I'm not blaming you. Only I wish someone else had my job."

"Well," said the Director, heavily. "You might as well get started." He nodded his head in dismissal.

As the biophysicist went out the door, the Director looked down once more at the pile of papers before him. He pulled the top sheet closer, and rubber-stamped across its face—CASE CLOSED.

"Yes," he mused aloud. "Closed for us, but—" He hesitated a moment, and then sighing once more, signed his name in the space provided.

AUGUST 6, 430th Year GALACTIC ERA

Tee Ormond sat morosely at the spaceport bar, and alternately wiped his forehead with a soggy handkerchief, and sipped at his frosted rainbow, careful not to disturb the varicolored layers of liquid in the tall narrow glass. Every now and then he nervously ran his fingers through his straight black hair, which lay damply plastered to his head. His jacket was faded and worn, and above the left pocket was emblazoned the meteor insignia of the spaceman. A dark patch on his back showed where the perspiration had seeped through. He blinked and rubbed the corner of his eye as a drop of perspiration ran down and settled there.

A casual look would have classified him as a very average looking pilot such as could be found at the bar of any spaceport; i.e. if space pilots can ever be classified as average. Spacemen are the last true adventurers in an age where the debilitating culture of a highly mechanized civilization has pushed to the very borders of the galaxy. While most men are fearful and indecisive outside their narrow specialties the spacemen must at all times be ready to deal with the unexpected and the unusual. The expression—"Steady as a spaceman's nerves"—had a very real origin.

A closer look at Tee would have revealed the error of a quick classification. He gripped his drink too tightly, and his eyes darted restlessly from side to side, as though searching, searching; yet dreading to find the object of their search. His expressive face contorted in a nervous tic each time his eyes swept by the clock hanging behind the bar. He glanced dispiritedly out the window at the perpetually cloudy sky and idly watched a rivulet of water race down the dirty pane. He loosened his collar and futilely mopped at his neck with the soggy handkerchief, then irritably flung it to the floor.

"Hey, Jo," he yelled to the bar-

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tender. "What's the matter with the air-conditioning? I'm burning up."

"Take it easy," soothed the bartender, consulting a thermometer on the wall behind him, "it's eighty-five in here. That's as low as the law allows. Can't have too much difference in the temperature or all my customers'd pass out when they go outside. Why don't you go into town? They keep it comfortable under the dome."

"Don't this planet *ever* cool off?" asked Tee.

The bartender chuckled. "I see you don't know too much about Thymis. Sometimes it drops to ninety at night, but not too often. You ought to be here sometime when the clouds part for a minute. If you're caught outside then, it's third-degree burns for sure."

He glanced down at the nearly empty glass. "How about another rainbow? If you get enough of them in you, you won't notice the heat—you won't notice anything." He laughed uproariously at the hoary joke.

Tee looked at him disgustedly and without answering bent to his drink once more. He felt someone jostle his elbow and turned sideways to allow the newcomer access to the bar. After a moment he wiped his forehead on his sleeve. The bartender placed another rainbow before him.

"Hey, I didn't order that," he cried.

The bartender nodded toward the next stool. "On him."

Tee turned and saw a barrel-chested red-haired giant holding up a drink in the immemorial bar toast. He raised his own glass gingerly, but his trembling hand caused the layers to mix and he stared ruefully at the resultant clayey-looking mess.

The redhead laughed. "Mix another one, Jo."

"But—" Tee's face got red.

"I came in here to talk to you anyway," said the giant. "You own the *Starduster,* don't you?"

"Yeah, what about it?"

"Like to get her out of hock?"

"Who says she's in hock?"

"Look," said the redhead. "Let's not kid each other. Everybody around this port knows you blew in from Lemmyt last month and can't raise the money to pay the port charges, much less the refueling fee. And it's no secret that you're anxious to leave our fair planet." He winked conspiringly at Tee.

"So?"

The redhead glanced at the bartender who was busy at the other end of the bar. He leaned closer and whispered. "I know where the *Elen of Troy* is."

"The *Elen of Troy?*"

"Oh, that's right, you wouldn't know about her. Eight months ago she crashed on an uninhabited planet somewhere in this sector. So far they've been unable to find her." He leaned closer. "She was carrying four million in Penryx crystals."

"What's that to me?"

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The redhead looked around briefly to make sure no one was in hearing distance, then whispered softly, without moving his lips. "I told you, they can't find her, but *I* know where she is."

"*You* know? But how—"

"Look," said the giant, frowning, "I didn't ask you why *you're* so anxious to leave."

"Well?"

"I'll clear your ship and we can pick up the crystals for the salvage fee. A million each, and all nice and legal. We can leave by the end of the week and be back in probably six months."

"*Six months!*" Tee stood up. "Sorry!"

The redhead grabbed his arm in a hamlike palm. "A million each in six months; what's wrong with that?"

Tee jerked out of his grasp. "I . . . I just can't do it."

"I don't know what you're running from," persisted the redhead, "but with a million credits you can fight extradition for the rest of your life. This is your big chance, can't you see that. Besides, this planet has some interesting customs." He winked at Tee. "I can introduce you—"

"I can't stay here," interrupted Tee. "You just don't understand."

"Look," cried the redhead exasperatedly, "I'm offering you a full partnership on a two million credit salvage deal and you want to back out because it'll take six months. On top of that you're broke and stranded and your hangar bill gets bigger every day. If you don't take me up on this deal, you'll still be sitting here six months from now wondering how to get your ship out of hock—if you don't get caught first. What do you say? What've you got to lose?"

What did he have to lose? Tee gripped the edge of the bar till his knuckles showed white. "No! I just can't do it. Why don't you get someone else?"

"The slow tubs around this port would take years for the trip. I can see the *Starduster* has class."

"Fastest thing in the galaxy," said Tee, proudly. Then earnestly, "I'm sorry, you'll just have to find some other ship."

"Think it over," said the redhead. "I'll wait. When you change your mind look me up. Name's Yule Larson." He slapped Tee heavily on the back and swaggered toward the door. He turned and looked back. "Better go along with me. After six months they can auction off your ship to pay for the port charges, you know." The door swung shut behind him.

Tee sat down again and bent his head, nursing his drink. His eyes darted nervously around the room and came to rest on the clock. A shudder ran through him and he lowered his eyes quickly. As he sipped his drink his eyes returned to the clock continually, as though drawn there against their will. As he watched, the minute hand jerked

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downward and an involuntary gasp escaped his lips.

The bartender turned quickly. "Anything wrong?"

"N . . . no, nothing." As he spoke, the minute hand moved again and Tee started nervously, upsetting his drink. He sat for a moment watching the bartender mop up the spreading liquid, then abruptly got up and tossed a half-credit piece on the bar. He hurried outside, steeling himself to keep from running. He paused just outside the door.

Stand still, he told himself. *Mustn't run! Mustn't run! No use anyway. If I only knew when. If I just could stop and rest. If I had the time . . . Time! Time! That's what I need. Light-years of time . . . But when? When? If only I could be sure.* He looked up slowly at the murky canopy of clouds. *If I only knew when!* He looked indecisively up and down the field, then squaring his shoulders resolutely, set out for the administration building.

At this hour the office was deserted except for a wispy-haired little man who sat at a desk fussing with some papers. He looked up questioningly as Tee came in.

"Is my ship re-charged and provisioned?" asked Tee.

"Uh, what's the name please?"

"Tee Ormond. I own the *Starduster.*"

The clerk pulled a card from a file on the desk and studied it. "Ah, yes, the *Starduster.*"

"I'd like to pay my bill and clear the *Starduster* for immediate departure."

"Uh, very good, Mr. Ormond." He consulted the card again. "That'll be fourteen hundred and eleven credits." He beamed. "We included a case of Ruykeser's Concentrate, compliments of the management." He handed a circular to Tee. "This is a list of our ports and facilities on other planets. Our accommodations are the finest, and we carry a complete line of parts." He smiled professionally.

"What about my key?" asked Tee, pulling out his wallet.

"Uh, let's see, number thirty-seven." The clerk started for a numbered board hanging on the wall. He never got there.

Tee whipped a stun-gun from inside his jacket and waved it at the clerk's back. It caught him in midstride, and unbalanced, he crashed heavily to the floor. Tee glanced briefly down as he stepped over the paralyzed form, avoiding the accusing eyes, and snatched the magnetic key off the hook. He forced himself to walk calmly across the field toward the hangar that housed the *Starduster.*

A uniformed guard stopped him at the hangar door. "May I see your clearance, sir?" he asked, politely.

Tee hesitated for a moment. "Oh, I'm just going to get something out of my ship," he said, smoothly. "The clerk said it was roj."

"The clerk said? But he can't—" The guard tensed. "Mind if I check, sir? Orders, you know." He bent

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his head slightly as he pressed a knob on his wrist radio. As his eyes turned downward, Tee swung the stun-gun in an arc that ended on the back of the guard's head. As he leaped into the *Starduster* he was sorry for a moment that he hadn't had time to recharge the gun, and hoped he hadn't struck too hard.

OCTOBER 11, 433rd Year GALACTIC ERA

Tee stepped out of the hangar and surveyed the twin suns. The pale binaries sat stolidly on the horizon, forty degrees apart. Their mingled light washed down dimly on the single continent of the planet, Aurora.

He started, as a man walked around the corner of the hangar. The man looked at Tee searchingly for a moment, then asked, "Anything troubling you, Tee?"

"Why . . . why, no, Mr. Jenner. You just startled me, that's all."

"Well, how's everything coming?"

"Right on schedule. We'll be ready for the final test by the end of the week."

"By the way," asked Jenner, speculatively, "how come you ordered the ship stocked and provisioned, for the test?"

"Why . . . why I think she should be tested under exactly the same conditions as she'll encounter in actual use."

"We could have done it a lot cheaper by just using ballast," said Jenner. "After this, I want to personally see any voucher for over a hundred credits before it's cleared."

"Yes, sir, but I just didn't want to bother you with details."

"An expenditure of over two thousand credits isn't just detail; but

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let it pass. It's already done. Anyway, on the drawing board she's the fastest thing in the galaxy." He smiled. "If she lives up to expectations, she'll make your ship look like an old freighter. We've got four million sunk in her so far, so she'd better check out roj."

He put his hand on Tee's shoulder. "You're not worried about testing her, are you? You've been jumpy lately."

"Oh, no, nothing like that, Mr. Jenner. I'm just . . . well, I've been up all night watching them install the gyroscopes. Think I'll get some sleep." He yawned.

Jenner cupped his chin in his palm and stood staring after the retreating figure. As Tee turned and looked back nervously, Jenner entered the hangar office. He spoke softly into the visiphone and in a moment the screen lit up.

"Is this the prison administrator?" asked Jenner.

"What can I do for you?"

"My name is Jenner: Consolidated Spacecraft."

"Yes?"

"Suppose an escaped prisoner from Hades landed on Aurora?"

"*No one* escapes from Hades Prison."

"Well, just suppose one did?"

"I never receive information about escapees."

"But you're the administrator here."

"My job as the title implies, is purely administrative. I merely arrange transportation for our annual shipment of prisoners to Hades, and see that the records are kept straight."

"But whom *would* they contact in the event of an escape?"

The administrator pursed his lips in impatience. "Hades has six billion prisoners at any given time. If one did manage to escape, they couldn't very well alert a million planets."

"You mean you wouldn't do anything?"

"As I said before, my job is purely administrative. Out of my jurisdiction entirely. Each planet has its own police force and handles its internal crime in its own way. What's legal on Aurora might very well be illegal on ten thousand other planets, and vice versa."

"I see. Thank you." Jenner cut the connection slowly. He flicked the switch open again, hesitated, and then closed it.

He walked out to where his gyrocar was parked, and in a few minutes set it down on the roof of Tee's hotel. Tee was just entering the lobby as Jenner came in and they went up to his room together.

"I'll come right to the point, Tee," he said, as soon as the door had closed. "I just talked to the local prison administrator for Hades." He looked closely at Tee.

"What's that got to do with me?" asked Tee, belligerently.

"Wait until I finish," said Jenner, curtly. "I hired you to test-hop our new ship because you were the best pilot available. I'm not interested in

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your past, but most of the company's resources are sunk in that ship. If something goes wrong because the test pilot is disturbed or nervous, the company will be bankrupt. I'm not saying you're an escaped prisoner, but if you were, you'd have nothing to worry about."

"What do you mean?"

"The administrator told me he has no jurisdiction over escaped prisoners, so you see, if you had escaped, you'd have nothing to fear here. You're out of their jurisdiction."

Tee began to laugh wildly. "*Out of their jurisdiction! Out of their jurisdiction!* So that's the way they put it. *Out of their jurisdiction!*"

"Stop it!" said Jenner, sharply. "Do you want to tell me now?"

Tee drew in a gasping breath and sobered. "What would I have to tell you? So I'm the nervous type. So you hired me to test-hop your new ship. So I'll test-hop it. That's all we agreed on. What more do you want?"

Jenner sighed. "Roj, Tee, if that's the way you want it, but I wish—"

The visiphone buzzed, and when Tee flipped the switch, the worried face of the chief mechanic sprang into focus. "Oh, there you are, Mr. Jenner. Glad I caught you before you left. We've run into trouble."

"Well, out with it," barked Jenner. "What is it?"

The mechanic cleared his throat nervously. "We were testing the main gyroscope when it threw a blade."

"How bad is it?" asked Jenner.

"Pretty bad, I'm afraid. It tore up the subetherscope unit so bad we'll have to replace it. We can't get any on Aurora either. We'll have to send to Lennix, and that'll take close to a month."

"Roj! Knock off until I get there," barked Jenner. He slammed over the switch, viciously. "Of all the rotten luck!"

"Can't you get some plant here on Aurora to hand tool one for you?" asked Tee.

"No, that's just it," replied Jenner. "It's a special alloy. The owners of the process wouldn't give us any details on the manufacture. Anyway, even if we knew how, we couldn't duplicate it without their special machine tools."

"Does that mean—"

"I'm afraid so. The ship won't be ready for a month, now."

"*A month!* I can't wait a month."

"*You* can't wait a month? We've got four million tied up in that ship and you tell me *you* can't wait a month."

"Look, Mr. Jenner, I'll test it without the unit."

"That's impossible. The ship would vibrate into a billion pieces as soon as it went into subspace. No! We'll just have to wait."

"I can't wait," cried Tee. "You'll have to get another pilot."

"Just a minute! You can't walk out on your contract. If it's a matter of credits—"

Tee shook his head. "That's not it at all. I just can't stay that long."

Jenner looked at him angrily.

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"Well, your contract isn't up till the end of the week anyway. We'll see what we can do about a replacement then."

After Jenner had left, Tee sat smoking in the darkness. He placed his elbow on the couch arm and cupped his chin in his palm. Then restlessly, he snuffed out his cigarette and rubbed his hands together. They felt moist and clammy. He jerked nervously as a click sounded out in the hall. Only a door opening across the way. He bit the fleshy part of his middle finger and then began to worry his ring with his teeth. He lit another cigarette and dropped it into the disposal almost immediately.

He got up and began to pace the room. Six teps forward. Turn. Six steps back. Turn. Six steps forward —or was it five this time? The walls seemed to be closing in, constricting. His head felt light and his tongue and palate grew dry. He tried to swallow, and a feeling of nausea came over him. His throat grew tight and he felt as though he were choking. Rubbing his forehead with the back of his hand it came away wet with perspiration. He rushed to the window and struggled futilely with it, forgetting it was sealed shut in the air-conditioned hotel. He flung himself at the door, wrenching it open and took the escalator three steps at a time falling to his knees at the ground floor. A surface cab was sitting outside just beyond the entrance. He flung himself in, breathing heavily and fumbling to drop a coin in the slot, pulled the control lever all the way over.

Twenty minutes later, the *Starduster* hovered for a moment over Aurora, then shimmered and vanished as it went into subspace.

OCTOBER 2, 435th Year GALACTIC ERA

The *Starduster* materialized just outside the atmosphere of the planet Elysia, and fluttered erratically downward, like a wounded bird. A hundred feet from the surface, the ship hesitated, shuddered throughout her length, then dropped like a plummet, crashing heavily into a grove of trees.

For Tee there was a long period of blessed darkness, of peace, of non-remembering, then his mind clawed upward toward consciousness. The fear and uncertainty were with him again—nagging, nibbling, gnawing at his reason.

He fought to close his mind and drift back down into the darkness of peace and forgetting, but contrarily the past marched in review before his consciousness: The twin worlds of Thole revolving about each other as he fled down the shallow ravine before the creeping wall of lava, while the ancient mountain grunted and belched, and coughed up its insides. The terrible pull of the uncharted black star as it tugged at the feeble *Starduster*. The enervating heat and humidity of perpetually cloudy Thymis. Pyramids of gleaming penryx crystals piled high

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as mountains, and Yule Larson towering above the landscape, draining gargantuan rainbows at a single gulp; striding like Paul Bunyan across the land in mile-long strides and kicking over the pyramids of crystals, laughing uproariously at the sport. And Jenner, grinning idiotically, pointing a thick finger at him and repeating over and over: "Out of their jurisdiction! Nothing to fear! Nothing to fear! Nothing to fear! Noth—"

"Stop it! Stop it!" cried Tee, and a brilliant burst of light like a thousand sky-rockets seemed to go off in his head. He shrieked like an animal in agony, then fell back sobbing, bathed in perspiration.

Something cool touched his forehead and he pulled away violently, then as his head cleared he opened his eyes slowly. A blur of shadows and light shimmering indistinctly, then suddenly like the picture on a visiphone the blurs coalesced and formed a clear image, and everything was normal again, the fear still hovering close, but pushed back for the time being.

A girl stood before him smiling rather uncertainly. The sweetness and cleanness of that smile after his recent ordeal washed over his tortured mind like a cooling astringent, and he smiled gratefully up at her. She put a cool palm on his forehead and as she started to withdraw it he clutched it in an emaciated fist and mumbled indistinctly through cracked dry lips.

She smiled down at him and smoothed back his damp hair. She pulled up a chair beside the bed and continued to stroke his hair until his eyes closed in sleep.

He awoke ravenous and thirsty, but lay quietly for a time, luxuriating in the feel of the clean soft sheets. He was in a simply but tastefully decorated room. Three of the walls were made of transparent glass and the warm golden rays of a type G sun bathed the room. Outside he could see green rolling meadowland, broken here and there by sylvan groves. A brilliantly colored bird swooped down and preened itself for a moment, then raised its head and flooded the silence with melody. Faintly from a grove of trees came an answering treble. The songbird cocked its head to the side, listening, then swooped upward on wings of flashing color. A small squirrellike creature bounded nervously up to the transparent wall and sat on its haunches, surveying the room with bright beady eyes. As Tee's ears attuned themselves he was suddenly aware of chirpings, trebles, clear-pitched whistles, and from somewhere in the depths of the grove, a deep-pitched ga-rooph, ga-roomph.

A chubby little man with a round face and alert twinkling eyes entered the room. He seemed to radiate happiness and contentment. "Well, I see the patient's finally come around," he said, cheerfully.

"What happened?" asked Tee.

"Your ship crashed just beyond that grove."

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Tee clutched at him. "The ship! How bad is it?"

"I think you were in worse shape than your ship. You must have had it under control almost to the end, though how you stayed conscious with space fever is beyond me."

"Space fever? So that's it. I remember getting sick and light-headed and just before I passed out I flipped out of subspace and the automatic finder, of course, took the ship to the nearest planet. I must have landed by reflex action. I sure don't remember anything about it."

"Well," the man laughed, "I *have* seen better landings, but not when the pilot had a temperature of one-o-five. Anyway, you're safe now. Welcome to Elysia."

There it was again. Safe! Safe! Tee raised up, then fell back weakly.

"Is anything wrong?" asked the little man, alarmed.

"N . . . nothing, I just . . . nothing!"

The man was looking at him questioningly.

"Elysia," mused Tee. "I seem to remember an old old myth brought from the original Earth." He waved toward the sylvan setting, outside.

The little man smiled. "Yes, the old settlers named our planet well." He caught himself. "Oh, I'm sorry; I'm Dr. Chensi. This is my home."

Tee smiled. "Well at least you'll have to admit I showed good judgment crashing next to a doctor's house." Then more seriously, "Thanks, doc, thanks for everything."

"My degrees aren't in medicine," replied Dr. Chensi. "I'm afraid I had little to do with your recovery. My daughter's the one who nursed you. Oh, here she is now." He raised his voice. "Come in, Lara."

Since Dr. Chensi was using the only chair she sat down on the edge of the bed.

"Here," said the doctor, teasingly, "what kind of nurse are you, mussing up your patient's bed?"

She pouted prettily. "He's *my* patient." Then looking down at Tee with a smile, "You'll be up and around in no time now."

"Time!" cried Tee, raising up. *"What's the date? I've got to know!"*

"You've been delirious for two weeks," answered the doctor. "Another two weeks of convalescence and you ought to be as good as new."

"But two weeks, I can't—"

"Can't leave before then anyway," replied the doctor calmly. "I knew you'd want your ship repaired so I had it hauled to the port. Won't be ready for two more weeks. So you might as well relax."

Tee bit his lip, and clenched his fists to keep from trembling. It was a moment before he could trust himself to speak without a quaver in his voice. "Nothing else I can do, I guess. Thanks, anyway. And by the way, there's enough credits in the ship's safe to pay for the repairs, I'm sure."

"I think we should start the patient walking tomorrow," said Lara, in a mock-professional voice. She

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punched the ends of Tee's pillow. "Now you'd better get some sleep. You're still very weak, you know."

The days that followed were like an idyll for Tee. With Lara he wandered through the parklike wooded groves. They sat near shaded pools and ate wild berries while she told him stories of the founding of Elysia. They held hands and ran exuberantly across the grassy meadows, and waded like children in the clear brooks.

A thousand times, a word, an endearing term, sprang to his lips, and each time the fear clamped his tongue in a vise of steel. A thousand times he wanted to touch her, feel the silkiness of her hair, the warmth of her lips, but each time the fear and uncertainty stood between them like twin specters of doom, pointing and saying, "Fool! Why torture yourself?"

In the daytime when Lara was with him it wasn't so bad, but at night the fear and uncertainty crowded to the fore and blanked out everything else. It was then he prayed for the courage to kill himself, and despised the weakness that made him draw back from the thought. If only he could stop thinking. Make his mind a blank. But that was death, and death was what he feared. How long ago was it when he'd first realized that hope was an illusion, a false god that smiled and lied, and held out vain promises only to prolong the torture?

Then one day the word came that his ship was repaired. As though the word were a catalyst the terrible fear overwhelmed him, drowning out every other thought, and he knew he had to leave. When he had no means of leaving the planet he could partially close off his dread and wait resignedly. But now that the ship was ready, every moment he remained was an agony.

He led Lara to their favorite spot by a quiet pool. She looked radiant, and smiled to herself, as though at a secret. He steeled himself and finally blurted out, "Lara, I'm leaving tomorrow." He hesitated and bit his lip. "And . . . thanks for everything."

"Thanks?" She choked on the words.

"I'm sorry—" he trailed off, lamely.

"But . . . but I thought—" She looked down.

He reached out and gently touched her cheek. "Can't you see I *want* to stay?" he pleaded.

"Then why? Why?" She was crying now.

"I . . . I just can't. It's no good." He stood up.

She reached out and caught his hand. "Then take me with you. I've heard you at night pacing in your room. I don't know what it is that drives you on and on, but if space is what you want, let me go with you. I can help you, darling. You'll see. And some day when you grow tired of space, we can come back to Elysia." She was babbling now.

He pulled roughly away. "No!

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It's no good. I'm— If only I *could* stay." He brushed her hair softly with his palm and as she reached out toward him he turned and walked swiftly toward the house, pitying and hating himself by turn, while Lara sat forlornly by the pool looking after him.

He began to sweat before he reached the house and his knees began to tremble so, he had to stop for a moment, to keep his balance. Determinedly he started forward again and continued on past the house to the highway that wound by half a kilometer away. There he hailed a passing ground car and rode to the spaceport, where a few judiciously distributed credits facilitated his immediate clearance. Before the ship had even left the atmosphere he rammed in the subspace control.

MAY 4, 437th Year GALACTIC ERA

Tantalus lay far out on a spiral arm, well away from the main stream of traffic that flowed through the galaxy. It was a fair planet boasting an equable climate, at least in the tropic zone. But as yet the population was small, consisting mostly of administrative officials who served their alloted time and thankfully returned to their home planets closer to the center of population.

Tee entered the towering building and after consulting a wall directory stepped into the antigrav chute and was whisked high up into the heart of the building. He stepped out before a plain door and as he advanced the center panel fluoresced briefly with the printed legend—GALACTIC PRISON AUTHORITY, Ary Mefford, Administrator for Tantalus.

He hesitated for a moment, then squaring his shoulders stepped forward, and as he crossed the beam the door swung open before him. The gray-haired man sitting at the desk studying a paper, looked up and smiled politely. He indicated a chair with a nod then bent his head again. After a moment he shoved the paper aside and looked questioningly at Tee.

"I want to give myself up," blurted Tee.

"I'm the administrator for Hades," said the man calmly. "I think you want the *local* authorities."

"You don't understand. I escaped from Hades."

"No one escapes from Hades," replied the administrator.

"*I* escaped!" insisted Tee. "Ten years ago. You can check. I'm tired of running. I want to go back."

"This is most unusual," said the administrator in a disturbed voice. He looked unbelievingly at Tee. "*Ten years* ago you say?"

"*Yes! Yes!* And I'm ready to go back, before it's too late. Can't you understand?"

The administrator shook his head pityingly. "It's already too late. I'm sorry." He bent his head guiltily and began to fumble with the papers on his desk.

Tee started to say something, but the administrator raised his head and

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said slowly, "It was too late the day you left Hades. Nothing I can do." He looked down again. Tee turned and slowly walked out the door. The administrator didn't look up.

As Tee walked aimlessly down the deserted corridor, his footsteps echoed hollowly like a dirge. A line from an old poem sprang to his mind: "We are the dead, row on row we lie—" He was the dead, but still he chased the chimera of hope, yet knowing in his heart it was hopeless.

JUNE 11, 437th Year GALACTIC ERA

The *Starduster,* pocked and pitted from innumerable collisions with dust particles, sped out and out. The close-packed suns of the central hub lay far behind. Here at the rim of the galaxy the stars lay scattered, separated by vast distances. A gaunt hollow-eyed figure sat in the observation bubble staring half-hopefully, half-despairingly at the unimaginable depths beyond the rim.

JUNE 12, 437th Year GALACTIC ERA

On and on past the thinning stars raced the patient electronic bloodhound; invisible, irreversible, indestructible; slowly, but inexorably accelerating. It flashed by the planet Damocles at multiples of the speed of light, and sensing the proximity of the prey on which it was homed, spurted into the intergalactic depths after the receding ship, intent on meshing with and thereby distorting the encephalograph pattern of its target. It was quite mindless, and the final pattern its meshing would create would be something quite strange, and not very human.

THE END

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BY P. SCHUYLER MILLER

YET! AND SUCH

Any one of us, individually, knows very little about the Earth from personal observation. Trace a pencil line on the map some time, as a log of your own comings and goings, and see for yourself what little area is covered. Of course, our human ability to pass our observations on to others means that each person's individual squiggle of experience is supplemented by the scrawls of every other person . . . but it's a fairly common experience to find localities where "everyone knows" something that the rest of the world has been trying to discover for years.

In the books Willy Ley writes in his guise of "a romantic naturalist" —"The Lungfish, the Dodo, and the Unicorn," "Dragons in Amber," and now "Salamanders and Other Wonders," (*Viking Press, New York; 1955; 293 pp.; Ill.; $3.95*)—he has underscored the many cases in which supposed extinct or mythical creatures have turned up as big as life. The theme, of course, was cemented into the science-fiction tradition by Conan Doyle's, "The Lost World," but nearly everyone else

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has had a hand at it and Doyle was by no means the first. "Histories" of dragon-slaying knights, in an age when there were obviously no dragons roaming around Europe, had a science-fictive aspect in that people believed such monsters had once existed.

In the new book, only four of the twelve chapters have this aspect of fiction or tradition solidified into fact. The other eight show the unraveling of zoological and botanical (and ornithological) puzzles—which, as you should know, makes them no less interesting.

In this latter section you will learn something about the peculiarities of certain salamanders, which though in the larval stage—seemingly "frozen" there biologically—can still reproduce, and can sometimes be forced into the adulthood which they would ordinarily never attain. You'll learn, too, of the evolutionary dilemma which this behavior poses. If you've heard Man spoken of as "the tool-using animal," you may be perplexed at the chapter on animals which use tools. There are stories of two birds, the cahow of Bermuda and the waldrapp of medieval Switzerland, which disappeared only to be found again. There are chapters on two strange branches of the reptilian kingdom, the first birds and their flying predecessors, and the giant tortoises. There's another on that "furry old man of the sea," the sea otter, and one on the world's biggest and most mysterious nut.

But we have a special interest here in monsters and wonders. It's been a long time since I saw a science-fiction story about man-eating trees here on Earth—of course, they're standard equipment on other planets—but back around the days when science fiction first became a movement, in the first years of *Amazing* and *Science Wonder,* such things were regularly transplanted from their original habitat in Madagascar to the Brazilian jungles. Here Willy Ley traces the origin of the story to a hoax of the 1880's—or, possibly, to an exercise in early science fiction. An even more widely accepted botanical legend, that of the Javan upas tree which was supposed to poison the air and soil for miles around, is run to ground very plausibly as a distorted combination of two unrelated phenomena.

Stories of "little people" living in remote places are part of the folklore of almost every part of the world. In a chapter which you may have seen in *Other Worlds,* this collection of supposition and evidence is brought down to the present. To me it's not beyond possibility that stunted stocks may have developed under hardship conditions during the Ice Age, and have remained aloof for generations before they merged with the "big people" who displaced them from hunting grounds where food was easier to come by. It is said that in the Seventeenth and Eighteenth centuries a definite physical type developed in French Canada among the *voyageurs* of the fur

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trade: short legged for squatting in canoes, massively muscled in their backs and arms for paddling and hauling. And there is, of course, the pigmy stock spread from Africa to Melanesia.

But the chapter that is as immediate as yesterday is the account of the "Abominable Snowmen." These mysterious creatures, as natives and mountain climbers both testify, inhabit the lower snows of the Himalayas. They are man-sized and go on two feet like men, and some of the stories make them tool-users like men. That they exist is certain: what they are, nobody knows, although bits of hair from a "scalp" in the Thyangboche lamasery have been studied by zoologists who say that they are not from a langur monkey or a bear. Incidentally, newspaper reports that the hairs were immediately identified as coming from a goat are not mentioned and I suspect they are fiction.

Because Willy Ley's chapter on the Snowmen is for once not the latest word on the subject. Ralph Izzard, the London *Daily Mail* reporter who trailed the Everest expedition, went back to Nepal to try to capture a Snowman. He did not succeed, but he has certainly assembled more, and more detailed, information on the subject than we have ever had before. He saw (or one of his expedition, Charles Stonor, a zoologist, did) the Thyangboche scalp—which is actually in the nearby temple of Pangboche—and describes it in detail. The scalp appears to have been "collected" some three hundred and fifty years ago. Moreover, the expedition discovered and nearly succeeded in bringing to London a second scalp, reputedly the mate of the first one.

The story is told in full in "The Abominable Snowman," (*Doubleday & Co., Garden City, N. Y.; 1955; 250 pp.; Ill.; $4.00*), which you can read either as a travel-adventure book or as a scientific mystery. Izzard and his companions talked with many natives who had seen the "Yeti" or Yeh-Teh. This, by the way, seems to be a simpler and more easily remembered name than the jaw-breaking Tibetan *metohkangmi* under which the creature was first reported in 1921, and which gave it its English name.

It turns out, for one thing, that two creatures are involved. One, the Dzu-Teh, is a large four-legged beast with reddish fur which preys on the Sherpa and Tibetan herds. Probably it is the Tibetan red bear, the animal often cited as the source of Yeh-Teh tracks. The second is known as Mih-Teh . . . and "Mih" means "man," so that this is the creature that looks and acts like a man. The two are thrown together as "Yeh-Teh" since "Yeh" means "rocky places," and rocky places are exactly where both bears and Mih-Teh hunt for food.

During their weeks in Nepal, the men of the *Daily Mail* expedition hunted for, found, and followed numerous Mih-Teh tracks. The photographs reproduced in Izzard's book show exactly nothing, but Willy

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Ley's chapter in "Salamanders" has a clear drawing from Eric Shipton's photograph of fresh tracks, made in 1951. They studied the creatures' droppings and found that they were eating mouse-hares, fur, bones and all, marmots, and insects. It seems not to be a tree-dweller like the big langur monkeys of the Himalayan high forests: it ranges in the open, rocky strip between the forests and the snows, coming lower near the villages in winter.

Here is Charles Stonor's description of a Yeti or Yeh-Teh—the "Teh" is pronounced "tay"—assembled from the accounts of Sherpas from ten villages and Tibetan traders:

"A smallish, squat animal, about the size of a fourteen-year-old boy: covered with stiff, bristly hair, reddish brown and black in color, with a flat face like a monkey, a rather pointed head, and no tail. It was described as normally walking on two legs manlike, but if frightened, or on rocky ground, bounding along on all fours. It had a distinctive call, a loud mewing note . . . like the mewing of a sea gull."

Izzard's book renders no verdict; Willy Ley discusses the possibilities more fully. The Yeti is a mammal and usually a biped; its foot could be a man's or an ape's. Perhaps there is an unknown great ape in Central Asia: if so, it has advanced much farther from the trees than have any of the other apes . . . perhaps as far as the first men. And perhaps there are surviving subhumans, neither apes nor men.

The chapter on "The Little People" touches this possibility from another angle. There are stories of five-foot, erect-walking, russet-furred men—"agogwe"—in East Africa, in the very region where abundant fossil remains are turning up of the pre-men with ape-sized brains called collectively *Australopithecus*.

You will find a very technical anatomical discussion of these little ape-men in a book by Dr. W. E. Le Gros Clark, Professor of Anatomy at Oxford, "The Fossil Evidence for Human Evolution" (*University of Chicago; 1955; $6.00*). The archeological evidence is by no means complete. What does emerge is that these creatures are what an anatomist would expect of the common subhuman stock from which all known fossil and living breeds of man are derived—*but,* at the time they lived in South Africa, other modern men were also there. *Australopithecus* seems to have been a living fossil, unchanged through a million years or more. Perhaps, in one of the spots on the map of the world not yet visited by book-writing men, he and others like him are still living as "Yeti" or "Agogwe" or whatever the local name may be. Probably he uses tools (even insects do), probably he does not have fire (the evidence from the South African caves is questionable and questioned). The accounts of the Yeti's weird cries sound more like animal calls than speech—although

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many modern peoples have traditional signal cries.

At any rate, you can be of good cheer: there are still wonders and prodigies to be found in the world.

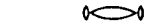
THE MARTIAN WAY AND OTHER STORIES, by Isaac Asimov. Doubleday & Co., New York. 1955. 222 pp. $2.95.

After lying quiet for a bit, Doubleday has come back with a roar. This first bellow consists of two long novelettes of the sort which make up some of the best science fiction, and which most publishers carefully ignore in favor of "more titles for your money," matched with two good short stories. Collectively, they show that Isaac Asimov can characterize people as well as robots and is turning out some of the best middle-of-the-road science fiction we have.

The title story is from *Galaxy*. It sets up a very logical socio-political situation developing out of the cost of supporting a Martian colony, then shows a very Martian reaction—with a couple of nice gimmicks just to prove that you can still use 'em if they're good. The closer is from this magazine: "Sucker Bait," the story about Mark Annuncio of the Mnemonic Corps and the mystery of the lost colony on Junior. Here the mystery got too strong a hand over the gimmick.

In between we have the top-notch "Youth" from, I believe, *Space Stories*, which does not at all need its snap ending. In it, two youngsters capture some tiny monsters from a fallen star ship and try to make pets of them. The fourth story is "The Deep," also from *Galaxy*, and to my taste the least of the lot. Here a nonhumanoid must save his race by entering the mind of a human being and using the latter's body to activate a gadget that will bridge space. But . . .

No awards here, but it's all good.



THE FITTEST, by J. T. McIntosh. Doubleday & Co., New York. 1955. 192 pp. $2.95.

Doubleday's second offering in June is a brand-new and good novel by the author of, most recently, "One in Three Hundred." It's quite unlike his other books, as though the John Wyndham of "Day of the Triffids" were underplaying the idea Poul Anderson had in "Brain Wave."

Some time not long from now a biologist named Paget will succeed in stimulating the mentality of a few domestic animals: laboratory rats and mice, of course, cats, dogs, and a few horses. Unexpectedly, the "paggets" breed true in the third generation—and in no time Man has his back to the wall, struggling for survival.

We pick up the story a little later as the wife of Paget's surviving son

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is maneuvered to her death in a French farmhouse by a taunting pamouse and a ruthless pacat. His brother was shot by a Chicago mob; his young sister was impaled on the fence under his window; he and his wife have momentarily escaped the mobs, but not the paggets. And we follow him to England, where he locates an older sister and helps her and other hard-cored survivors build themselves a little commonwealth reasonably proof against paggets and men.

It isn't pretty. It isn't melodramatic. Don Paget is no soap-opera hero and Ginette, the girl he picks up in France, is no formula heroine —if she is a heroine at all. It's a wry book and likely to leave you with odd memories. Mine is that pamouse, sitting, mocking, as Gloria shrinks against the locked door . . .

GLADIATOR-AT-LAW, by Frederik Pohl & C. M. Kornbluth. Ballantine Books, New York. 1955. 171 pp. $2.00 & 35¢.

This is *Galaxy*'s big serial of 1954 and the most ambitious Pohl-Kornbluth slash at the future since "The Space Merchants," rather thoroughly rewritten for book publication and with a finale of financial blood-letting to follow the physical slaughter of the magazine version. This is far more of a nightmare world than the earlier book, and in this year of 1955 with its already glorious record of bloodshed and slaughter in the name of public entertainment, Pohl and Kornbluth seem as ever to be peering into a crystal ball.

We are in a fantastic future where GML Homes, manufacturers of the Bubble Houses around which the entire social heirarchy is built, literally run the country if not the world. As our hero we have a young lawyer, Charles Mundin, who hasn't the social standing to be a corporation lawyer and must struggle along in the gutter of criminal law. We have Belly Rave, the crumbling slums where nobodies and has-beens without contract status must struggle in a sink of depravity, and we have the Field Days and the tremendous industry which has grown up to produce the most hideous carnages the ingenious human mind can conceive. We have also the human creatures who must fight for their lives in those legal holocausts . . .

It's not the book "Space Merchants" was in its unified picture of a single-minded future society: the boys have too many balls in the air at once—almost as many as Dickens used to juggle. But it's even more merciless in its extrapolation of tendencies in our own times. And the book has had the benefit of afterthought and extra polishing which this team always considers essential. It will undoubtedly be in the running for the International Fantasy Award and is bound to place in the balloting, unless the publishers are holding back some remarkable stuff for the last half of the year.

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ADDRESS: CENTAURI, by F. L. Wallace. Gnome Press, New York. 1955. 220 pp. $3.00.

Here's a good idea, well worked out. I don't recall the original *Galaxy* version, but it's the story of the "Accidentals," the macabre collection of patched up half-men and women who have been carefully shelved away on an asteroid by the Masters of future Medicine. Anti, the ballerina who was infected by Venusian fungi until her body has become a gross mass of unnatural flesh, growing, unceasingly eaten away by the vat of acids in which she floats. Docchi, his arms and back muscles torn away, who can wear prosthetic arms for appearance's sake but can't move them. Jordan, gone from the waist down. Jeriann, her digestive tract destroyed. And Nona, deaf, dumb, seemingly unintelligent, yet a genius in her rapport with machines.

Biology has oddly compensated these people she has robbed of normal humanity. She has made them well-nigh immortal. And they have volunteered that immortality to serve as Man's emissaries in a flight to Proxima Centauri—but Man will have none of them. Rejected, drawing on their own determination and Nona's wizardry, they escape, converting their prison-world into a giant ship. But with that escape they have cut the chain of communication that brought them the drugs and biotics which kept many of them alive.

The author has done an excellent job of making his twisted people real and their problems logical. But somehow, the story just escapes being top-notch. It may be because Nona, the key to the entire situation, never quite registers as a person as even inert Anti does. It may be because the suspense lets down after the initial escape, so that the flight itself is anticlimactic (though its details are beautifully worked out). It's still a good example of the strides science fiction is taking. Once this kind of yarn would have been a pure Hollywood monster rally: now the monsters are people.

POINT ULTIMATE, by Jerry Sohl. Rinehart & Co., New York & Toronto. 1955. 244 pp. $2.75.

This strikes me as the poorest of Jerry Sohl's books to date. We are told the story; we never really feel it happening, though all the plot ingredients are there.

The time is 1999, thirty years after a Communist victory over the entire world. It was achieved by a Sax Rohmerish device—a fatal plague which infects everybody but the Enemy, and which can be held off only by monthly booster shots. Those who rebel, who infringe any law, who question any act of authority, get no shot when month's end rolls around.

Emmett Keyes, Illinois village boy, has a secret: he is immune. He sets out to find an anti-communist un-

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derground, and blunders into one adventure after another, winding up as the slave of a district director in a robot-run palace. Luck and determination give him the chance to escape. But why destroy what little uncertainty the plot has?

ONE IN 300, by J. T. McIntosh. THE TRANSPOSED MAN, by Dwight V. Swain. Ace Books, Inc., New York. 1955. 222 + 97 pp. 35¢.

You get this for the reprint side of the Ace Double: last year's three-episode novel about the young officer who must first select the ten people he will take to Mars when the Earth burns, then get them there, then live with them there. It's a very good book and I'm beginning to wish I had rated it higher in the International Award poll.

You get with it a fast moving but ordinary reprint from one of the 1953 Standard publications, in which a secret agent operates by implanting his mentality in body after body after body, all in a few minutes of undetectable surgery. There are lots of good ideas and gimmicks floating around in it, never quite realized, and too much of the doubletalking jaw-breaker school of s-f: "I gulped a vidal, then ordered spiked loin of rossa, seared in lorsch, with doralines from Mars and a salad of Ionian tabbat stalks . . . Afterward there was thick Venusian ronhnei coffee." Vidals, rossas, lorsch, doralines and tabbat play no other part in the story, and I don't believe he ever gets another drink of ronhnei.

ASSIGNMENT TO DISASTER, by Edward S. Aarons. Fawcett Publications, New York. 1955. 160 pp. 25¢.

This is a good, fast moving counterespionage chase story distinguishable from other Gold Medal original mysteries only by the fact that the spy ring is trying to sabotage Cyclops, the first American satellite station in the thousand mile orbit. No technical stuff, no science-fictive gimmicks, just chase and be chased. There's a sheaf of equations, but our hero has very little trouble finding them and thereafter just carries them around. Still—it *hasn't* happened yet, so it's laid in the future somewhere.

CITY OF GLASS, by Noel Loomis. Columbia Publications, New York. 1955. 128 pp. 35¢.

This first "Double-Action" s-f pocketbook is a rather old-fashioned action yarn about the far future, with some ridiculous physics in the earlier chapters and some good ideas elsewhere. It was a one-shot novel in *Startling* in 1942, and follows the formula you'd expect of that era and

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magazine. "Hart Niles"—unconvincing as a refugee Dutch physicist in the United States without papers—gets a job doing little or nothing at a secret rocket base in the New Mexico desert, operated by a Dr. Beckwith and his lovely daughter. They take off in an incredibly powered rocket, reach the velocity of light—after some gibberish about small forces producing enormous accelerations because they are outside the Earth's gravitational field—circumnavigate the universe and land again on an Earth of 800,000 A.D. Here all natural resources have been exhausted, and a bubble-city of "Glass Men" are breeding into themselves the ability to live on sand and solar energy. Meanwhile, their city covers a deposit of nitrates which is the last on Earth and which they need to grow food until they can become one hundred per cent sand-eaters.

A cave-dwelling race of white-skinned people called Cros would like the same deposit for the same purpose, and use violent means to get hold of it, including such an old-fashioned gimmick as bacterial warfare. Our scientists set out to develop a vaccine, direct the manufacture of glass guns, and reintroduce the fixation of atmospheric nitrogen (which super-physicists Niles and Beckwith seem to think requires uranium). Some of the details of the glass-based culture, especially its technology, are well worked out. Others won't hold water. No bargain here.

REPRINT RACK

POSSIBLE WORLDS OF SCIENCE FICTION, edited by Groff Conklin. Berkeley Publishing Co., New York. 1955. 189 pp. 35¢.

A new PB publisher selects ten stories from the Old Master's 1951 anthology for Vanguard. How can you lose?

TO WALK THE NIGHT, by William Sloane. Dell Publishing Co., New York. 1955. 223 pp. 25¢.

One of the all-time classics of science fiction, reissued by Dodd, Mead just last year. No library can be without it.

MAN FROM TOMORROW, by Wilson Tucker. Bantam Books, New York. 1955. 148 pp. 25¢.

This was "Wild Talents" when Rinehart published the hard cover edition: not Tucker's best; but better than many contenders.

THE END

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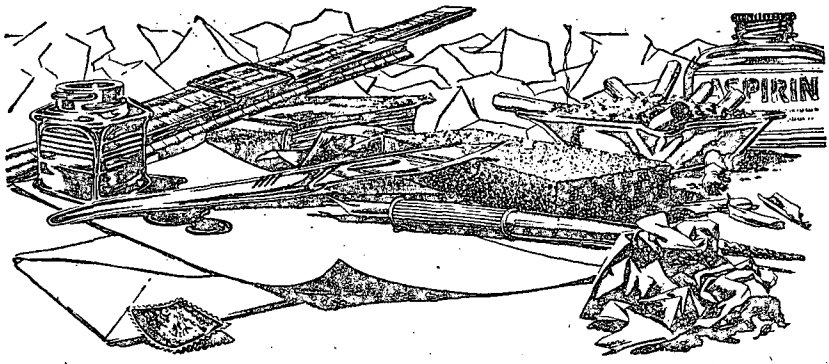

BRASS TACKS

Dear Mr. Campbell:

Another interesting statistic. From the average of AnLab ratings taken from seventy-five issues of Astounding over the last ten years, these authors—four or more stories published—stacked up in popularity in the following order:

1.	Hal Clement	1.93
2.	Clifford D. Simak	2.06
3.	Tom Godwin	2.17
4.	Poul Anderson	2.19
5.	A. E. Van Vogt	2.21
6.	Jack Williamson	2.32
7.	Mark Clifton	2.35
8.	H. Beam Piper	2.38
9.	Chad Oliver	2.39
10.	James Blish	2.46
11.	Isaac Asimov	2.56
12.	Walter M. Miller	2.60
13.	Theodore Sturgeon	2.62
14.	William Tenn	2.65
15.	Raymond F. Jones	2.70
16.	Robert A. Heinlein	2.71
17.	L. Sprague de Camp	2.72
18.	Frank M. Robinson	2.73
19.	Henry Kuttner, etc.	2.83
20.	Robert Sheckley	2.90
21.	Murray Leinster	2.93
22.	Eric Frank Russell	3.021
23.	E. B. Cole	3.023
24.	Chan Davis	3.12
25.	L. Ron Hubbard	3.15
26.	Algis Budrys	3.16
27.	Lester del Rey	3.284
28.	Katherine MacLean	3.287
29.	Lee Correy	3.30
30.	Fredric Brown	3.59
31.	H. B. Fyfe	3.60

I wonder how this corresponds with the word-length survey being taken by Mr. England. From his average it appears as if Mr. Clement seldom fails to make at least the one-

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half-cent bonus. On an 85,000 worder like "Mission of Gravity," that ain't hay!

Congratulations on a fine August issue. This woudn't be another "rigged" one like November, 1949, would it? With Russell, del Rey, de Camp, Blish, and art work by Rogers, it looks a mite suspicious.

Re your editorial: It is extremely difficult, if not impossible, to appraise purely creative thinking in terms of dollars and cents. Only by measuring it against the material gains that it brings about can the value of any philosophy or scientific theory be judged. The public will accept nothing but cold, hard facts, and if these changes don't become evident for fifty or a hundred years the philosopher will probably be doomed to a life of starvation. A truly great creative thinker must be able to do his work with full knowledge that he will be ignored and even decried by civilization until long after he is dead. Lucky plumber!—Lewis Kovner, 1113 N. Myers Street, Burbank, California.

And frequently the philosopher's generation feels acute discomfort from his work; they then feel that hanging is his proper reward!

Re the statistics: I don't question their numerical accuracy—but what do they mean, I wonder?

Dear Mr. Campbell:

Referring to your August and September editorials ("Philosophy Doesn't Pay" and "Game Theory"), it seems to me that there is another side to some of the questions you have raised. By way of illuminating that side, I should like to supply a few words of information—possibly also of opinion.

I am sure that no one would argue with the point that the highest order creative thinking is poorly rewarded in the material sense, although it can usually be made to provide a living. But your editorial ignores entirely the intangible rewards of doing such thinking. From what little is known about the subject, I submit that the mental insight gained from creative thinking and the satisfaction of demonstrating the ability to perform it are no small parts of the reward for those who are capable of high-order creativity. Furthermore, I do not believe that a person who could, and knew he could, add significantly to our understanding of the universe would long be content to be a plumber. Self-respect—and the very capability already referred to—would drive him to give all of his time and himself to the greater problems, and hang the material rewards.

This may not be an ideal situation as the rest of us mortals see it. However, the alternatives are not reassuring. As of this century, these alternatives are as follows: subsidy of the thinker by a patron of means, a university, a foundation, or the state. The first of these gives the best chance of impartial, because relatively uninformed, support of think-

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ing which may upset the current philosophical applecart. It is also most likely to be misguided by a plausible charlatan. As for the rest, somewhere along the line in every case you will come up against a man or a committee having the power of life or death over the proposed support. Now such men—and the committees composed of them—are chosen on the basis of their achievements and standing in the field of our thinker's endeavors, whatever this field may be. This bodes ill for the chances of support if the results of the thinking seem likely to send all the established authorities to the shelf or back to school . . . Which says that the first line of opposition to really original thought is found, not among the population at large, but among the cognoscenti. Check this against the historical record!

The situation as it relates to Dr. Einstein is, I fear, somewhat overdrawn. The late philosopher's house is located on one of the pleasantest streets in Princeton, and is neither tiny nor shabby. It could be described as modest, in the best sense—and this was in keeping with the character of the man himself.

But more important, let us not be drawn into the trap of defending, with fanatical intensity (cf. your own comment on the article "The Right to Breed"), the thesis that "the only rewards worth having are material rewards."

The rest of what I have to say relates to your September's comments on Dr. Oppenheimer. It is an oversimplification to say that he was "chastised"—whether viciously or otherwise is a matter of opinion—for holding unpopular views. Similar views have been expressed by equally prominent scientists with no ill effects. The essential point was the conflict between these views and the obligations of the position that he held. He was charged with the re-

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sponsibility of directing and furthering the development of weapons. His expressed opinions showed that he was not at all in sympathy with this work, and his actions gave added confirmation. On this basis, he was simply not the right man for the job.

Not that anyone in his right mind could be happy about the development of super-bombs—still less about their use if developed. But in a situation where a demonstratedly aggressive and unscrupulous enemy is involved, it is suicidal wishful thinking to argue, "If we don't have It, they won't use It."—Charles H. Chandler, 107 Westcott Road, Princeton, New Jersey.

Re Oppenheimer: Agreed that he was not the man for the job. That's exactly what he said! That he wanted nothing to do with the job. He was attacked because he wanted to retire from it.

Re payment for creative thinkers: Why not a patent system that allowed creative philosophers rewards on the order of those granted gadgeteers?

Dear Mr. Campbell:

Your devotional prologues are always good for some gray cell activity. The astute two-pronged editorial of the August issue apparently is directed at the bigoted and fanatical supporters of the status quo on the one hand, and is on the other a satirical slap at creative thinkers who do become plumbers, so to speak, for the sake of security so that they can go about their thinking in privacy.

I once had a professor who would periodically beat his brow and curse the circumstances that led him to become a professor instead of a plumber. But do you believe that a truly competent thinker *of today* can be so without vanity that he would remain a plumber, thinking in privacy? If Einstein had copied the way of Copernicus, he would soon have seen someone else popularize the theory of relativity, et cetera. The theses were not new—it was the synthesis that put the spotlight on Einstein.

The basic problem touched upon in your editorial is Hegelian: Thesis—Anthesis—Synthesis. In other words the status quo is continually in conflict with the new concepts of the creative thinkers, and sooner or later the new concepts are crushed or prevail in a synthesis. This is what I would call a vicious circle—a damnably strong one that will take a hell of a lot of "growing up" to break.

How can a culture "grow up" without the discipline of regimentation of its youth? That question poses another: How can a culture continue to "grow up" if it is regimented?

From my modest pinnacle the outlook for the competent creative thinker is not favorable, never has been, might never be—but *might* sometime be.—James F. Cook, 226 E. Harper Avenue, Lenoir, North Carolina.

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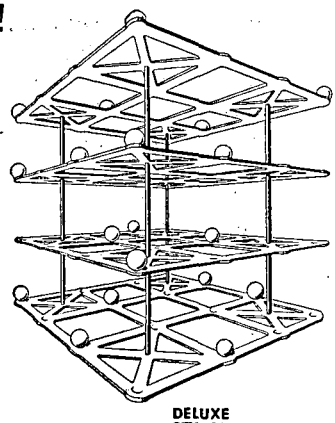

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But the Government is looking for creative thinkers to replace such losses as Einstein and Fermi. It's worth while to bring into sight the sociological forces that make the search so tough!

Dear John:

As you probably know, we were rather badly hurt by the August flood, and are being forced to move back into New York, lighter of possessions by about seventy-five per cent.

One of the brightest spots in the whole experience, however, was the donation to us of a substantial sum of money, contributed by people attending the science-fiction convention in Cleveland. On hearing that my office had been totally destroyed and that what records and manuscripts I had been able to rescue would have to be dried and copied, the convention offered us the money for secretarial help for that purpose, and we were more than glad to have it.

We would like with your permission to express our thanks in Brass Tacks to Noreen Falasca and Ray van Houten, who seem to have originated the idea, and to all the necessarily anonymous professionals and fans who contributed. We know that many convention-goers manage to attend these affairs only by saving all year for the purpose, so the large total can have been attained only at

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the cost of many real sacrifices; but welcome though the money itself was, we are even more grateful for the interest in our welfare which it shows.

We'd like to express gratitude, too, to Judy Merril and to Damon and Helen Knight, who gave us shelter and many hours of hard labor; and to all the confreres who called or wrote to ask how we were doing. Thanks to all of you, we're doing fine.—James Blish, P. O. Box 241, Milford, Pike Co., Pennsylvania.

Science-fiction people seem to be nice people.

Dear Mr. Campbell:

I see that Zeno's paradox is still being discussed in the British Edition of Astounding. May I make another contribution?

We start with a mathematical problem: To calculate the time *t* of a certain event *E*, the moment Achilles catches up with the tortoise (measured from the beginning of the race). Zeno suggests a step-by-step method for the solution of this problem. Trying it out, we soon realize that, no matter how many steps are taken, the exact value of *t* can never be discovered.

Does that mean we have demonstrated that the tortoise is never caught? Nothing of the kind; all it means is that—as long as we stick to Zeno's scheme—*we shall never know when*. It isn't *t* that's infinite but the time for finding *t:* it's not Achilles who fails to reach the tortoise, but Zeno who fails to reach the solution. What we have proved is that his method is no good and that we'd better try something else. But the fact that some methods are useless for some problems is no paradox.

If Zeno's "paradox" is not a paradox, what, then is it? Call it, if you like, a semantic trick; a deliberate confusion of object language and syntax language. There is a statement *A* about event *E:* "E takes place at time t." There is a further statement *B* about *A*: "*A* can never be proved." Conjuror Zeno throws *A* and *B* into his hat, stirs with his magic wand, and out of the hat pops statement *C:* "*E* never takes place."

We know something is wrong and start looking for false bottoms and hidden trap-doors; but we overlook the real clue which is right in front of our nose. And that is, of course, what a good conjuring trick means us to do.—D. G. Prinz, 384 Greenside Lane, Droylsden, Lancashire, England.

Hm-m-m—that sounds like a valid solution at that! The only trouble is, if the method "distance and time" won't work—what will?

Dear Mr. Campbell:

Have just finished reading the September issue and would like to take this opportunity to say how much I liked it.

One of the first things that caught

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my attention was the new illustration for the Reference Library on page 143. Although I am reserving comment on whether it is better or not, I couldn't help wondering how in the world you caught such an accurate representation of Mr. Miller at work. At any rate it isn't bad so long as you alternate pictures or something similar.

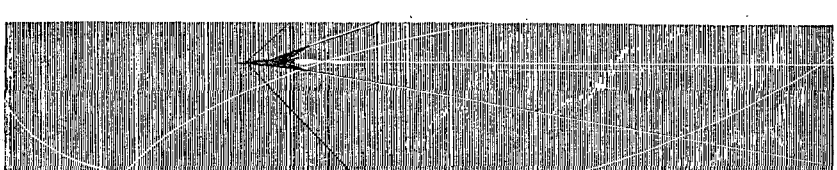
Isaac Asimov's article was one of the highlights of the issue, as usual. Please have much more of him. Couldn't help noticing an interesting coincidence in this. In the first two or three pages of the article much mention is made of Michael Tswett and his apparatus which was such an integral part of these type researches. Later I noticed that in your lead story ("The Gift of Gab") that the Tswett columns were mentioned several times, the first being on page 9, 6th line from bottom of left column. Wonder if Jack Vance has been talking to Mr. Asimov?

Finally, here are my ratings:

1. Call Him Dead
   Eric Frank Russell
2. The Gift of Gab
   Jack Vance
3. Scrimshaw
   Murray Leinster
4. Aspirin Won't Help It
   John A. Sentry
5. Blessed Are the Meek
   G. C. Edmondson

Keep up the good work. This is the best magazine in its field and I hope it remains there.—James P. Bulluck, III, 3118 Widgeon Road, Louisville 13, Kentucky.

No, Vance and Asimov had not been in communication.



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(*Continued from page 5*)
cal, optical, or chemical test has ever yet been able to define the difference between a living man and his corpse a second later; nothing seems to be missing save for some intangible, unreal Something called a "soul." The same type of tests—optical, mechanical and chemical—cannot distinguish between a magnetized bar of steel and an unmagnetized bar.

Of course, we are, in these times, very wise indeed, and we know how to detect a magnetic field, so it's very easy to show that there is a very great and important difference between the two bars of steel. We even have an explanation for it; in the magnetized bar, the magnetic domains, or cells, within the steel's crystalline structure, are aligned in an organized, co-operative manner, while in the unmagnetized bar, while all the domains or cells are present, the uniting organization is missing. It's really very easy to explain the reality-phenomena of magnetization.

Science is a wonderful thing—but it would be much more wonderful, I feel, if it weren't quite so much like the cocksure adolescent kid who knows that he knows all the important factors in the world, and has the basic solution to all the world's problems. Science might make more progress in some truly important areas if it weren't *quite* so sure it knew all the necessary factors to explain everything. What Science has discovered is, most certainly, necessary—but "necessary" is not equivalent to "sufficient."

The essential difference between the magnetized bar and the unmagnetized steel is a matter of organization—which is, certainly, a statement one can also make concerning the difference between a living man and a corpse. But no one yet has ever been able to make an instrument which will measure the strength of an organizational field. The difference between a mob and an army is real; organization. The difference between a team and a collection of star performers is equally real. The difference between a strong, effective story and one that's got some good ideas, and is well written, but just doesn't go over is the same.

"Organizational field" is not being used here in any allegorical sense; I've got a hunch that it's a very decidedly real and measurable-with-the right-instruments field-force. It's negative entropy, certainly. And it has some most remarkable effects.

A vast mass of gas in interstellar space is perfectly stable as it drifts idly around. Organize it a little, and a chain-reaction of increasing complexities is initiated; organization breeds organization, seemingly. The gas, once it is organized above a certain critical level, begins to fall together by mutual gravitation. If the organization is large enough and the necessary intensity of organization is achieved, the deuterium-deuterium reaction begins, and the gas mass is no longer stable. A star begins to glow.

The gas-and-dust mass has, meanwhile, been undergoing sub-organ-

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ization that produces planets circling the star. What happens on the planets, we certainly are not yet competent to define—but we know with absolute certainty that, in some instances, a higher-order organizational complexity called Life arises. And that this organization breeds further and higher-order organization.

Now one of the great stumbling blocks in the development of human relationship understanding—sociology, psychology, all the humanic sciences—has been inability to define the difference between "a difference of degree" and "a difference of kind."

We're still a long way from being able to do that—but I suggest that some of the concepts worked out in the Manhattan Project might be helpful, if combined with some of the concepts that Information Theory worked out for the radar development projects during World War II.

In any mass of U-235, there is continuous, spontaneous nuclear fission. Not only does U-235 decay by alpha particle emission as does U-238 and some of the other very-heavy elements, but U-235 also undergoes spontaneous fission, *without* being struck by a neutron, apparently. But workers on the Manhattan Project developed the concept of the "critical mass," the situation wherein the spontaneous reaction became self-exciting, and a chain-reaction took off.

Now it's normally referred to as the "critical mass," but a far more accurate terminology would be "critical parameters." If a twenty-pound sphere of U-235 can detonate, can one store one thousand pounds of U-235 in a single piece? Certainly; a simple half-inch thick disk of U-235 weighing one thousand pounds would be perfectly stable.

Also, we can make up an alloy of U-235 and U-238, and imagine a mass filling the entire total cosmos, and still have no chain reaction, if the U-235 is too dilute. In this case, we can consider a universe-full of the alloy, and gradually increase the concentration of U-235. At some point, a universe-full of the alloy will become chain-reactive. This would be an infinite-mass critical-alloy situation, instead of a pure-alloy critical-mass situation.

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There is an absolute upper limit to the possible intensity of U-235 concentration—pure U-235. There is an absolute limit to the intensity of mechanical organization, or geometrical organization—a sphere. Given the absolute upper limit of organization intensity with respect to the parameters of shape, purity, et cetera, *then* we can speak meaningfully of a critical *mass*. But given a fixed mass of, say, one thousand pounds, it then becomes appropriate to speak of critical *shape*, or critical *density*, or any of the other possible organizational factors.

Now in radar work, the problem was to detect the reflected microwave radiation bouncing back from the target. The difficulty was that a high-gain amplifier picked up the random noise of the outside world, and the random noises generated inside the equipment. The limit of detectability, then, was determined by the signal to noise ratio. A signal of one micromicrowatt was still exactly the same kind of signal that a one-watt signal was; what made the problem tough was that if the random noise energy happened to be twenty micromicrowatts, detecting the one-watt signal was a cinch—but the other . . . well, that was something else again.

Essentially, the problem's the same as that of the chain-reaction; if the "noise" of lost neutrons exceeded the "signal" of fission-reactions, there was no chain reaction. But at the critical point, where signal exceeded noise—the system takes off for higher regions.

The concept "difference of degree" is a continuous function concept; "difference of kind" implies a discontinuity of organizational structure.

I suggest that the differentiating characteristic is to be found at the organizational field level—and that the chain-reaction critical point is a typical example of true distinction between difference of degree and difference of kind.

The characteristic distinction of living forms is that they can reproduce themselves from nonidentical raw materials. But this is, in essence, saying that they can establish a chain reaction. A crystal can reproduce itself if dropped into a super-saturated solution of its own material—but a living cell can reproduce itself if dropped into a dilute solution of quite different material. This is, one might argue, merely a difference of degree. The critical factor is degree of organization involved.

Too bad we can't build an instrument with some kind of delicate, sensitive probe, that could read, on a meter dial, "12.5 orgs" or some such, when dipped into an organizational field.

The difficulty is, of course, that an organizational field must, necessarily, have the ultimate, pure essence of Observer Effect. If you are studying the organization of X's, and insert a non-X probe to measure it—by definition, that which you sought to measure does not exist where the probe is!

THE EDITOR.

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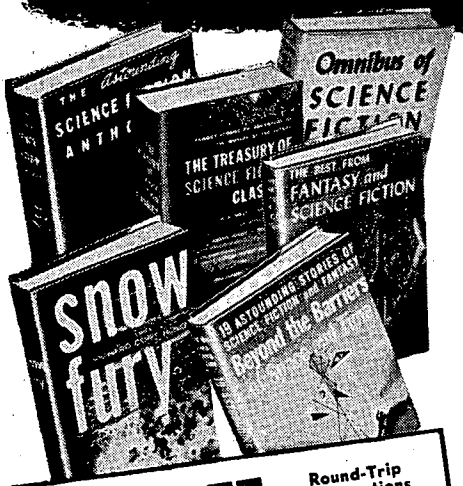

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